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DRAFT AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

for the Metropolitan Boston Area

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Submitted in fulfillment of
Section 208 of the Federal
Water Pollution Control Act
Ammendments of 1972

Metropolitan Area Planning Council

Part 1 - Volume I

DRAFT ENVIRONMENTAL IMPACT STATEMENT

and

DRAFT AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

for the

METROPOLITAN AREA PLANNING COUNCIL

April 1978

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DRAFT AREAWIDE
WASTE TREATMENT
MANAGEMENT PLAN PART I

FOR THE METROPOLITAN BOSTON AREA

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This Draft Areawide Plan was prepared by the staff of the Metropolitan Area Planning Council under the supervision of the Executive Director. Input, review and comment came from a wide range of individuals and Technical Advisory Committees. As a draft staff document, it will be placed before the Executive Committee and the Full Council for official endorsement.

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PART II

Part II, a separate volume of this Draft Areawide Plan, includes background information on:

Section 1 Implementation of the Areawide Plan

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THE NATIONAL GOAL

With the passage of the Federal Water Pollution Control Act Ammendments of 1972, Congress committed the nation to the most significant environmental program in its history.

> "The objective of the Act is to restore and maintain the chemical, physical and biological integrity of the Nation's waters, in order to achieve this objective it is hereby declared that...
>
> ...it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985;
>
> it is the national goal that, wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water be achieved by July 1, 1983..."

To help achieve the goals, the Act was funded initially at $16 billion over five years to support the construction of municipal wastewater treatment facilities. And an additional $24.5 billion for the next five years was authorized in the ammendments of 1977. The Act also established the National Pollutant Discharge Elimination System (NPDES) which required municipal and industrial polluters to obtain a permit to discharge wastes to the nation's waters. The permits, issued by the states and the U.S. Environmental Protection Agency, set conditions and schedules for eliminating pollution discharges. And the Act requires the recipients to pay for wastewater treatment services through user charges and industrial cost recovery.

But in section 208, Congress took its most innovative and forward-looking step. Section 208 established areawide water quality planning programs across the nation. Section 208 planning is unique in many ways:

- The 208 plans must deal with the well recognized point sources of pollution (those that come from a pipe) and with non-point sources (pollution from diffuse causes such as failing septic systems, leachate from landfills, stormwater runoff from streets, etc.)

- The plans must deal with means of preventing pollution as well as means of clearing it up;

- The plans must be areawide in scope and deal with problems that cross municipal borders ;

- The plans must be written with full citizen participation and make use of the public's wishes to the greatest extent possible; and

- The plans must identify the means of their implementation and establish an areawide management system to update and carry out plan recommendations through 1995.

THE MAPC

The task of preparing an Areawide Water Quality Plan for Metropolitan Boston was assigned to the Metropolitan Area Planning Council (MAPC) by Governor Michael S. Dukakis in 1975. The MAPC is Greater Boston's officially designated regional planning agency. Its membership consists of 101 cities and towns, 11 state agencies and 21 gubernatorial appointees. The Council is the representative agency for the major general purpose local governments within the metropolitan area for intergovernmental cooperation and comprehensive planning.

The MAPC's Water Quality Project is now engaged in a 208 planning program for one of the largest and most diverse planning areas in the nation. It involves 92 of the MAPC's 101 cities and towns and nine separate river basins. A population of nearly three million people will be effected by the results. The $2.3 million cost is fully funded by a grant from the U.S. Environmental Protection Agency.

The communities of this 208 area have, as required by EPA regulations, indicated their intent, "through formally adopted resolution, to join together in the planning process to develop and implement a plan which will result in a coordinated waste treatment management system for the area...."

The quotation above is from the sample resolution of intent adopted by the participating local governments. The resolution cited some of the reasons for the Council's designation:

> "...(to) insure the integration of waste treatment management planning into the overall comprehensive development planning process for the Boston Metropolitan area; and,
>
> ...(to) equip the Council's participating governments with a a significant new tool to guide and control development and growth..."

The resolution also noted a significant step taken by the Congress to insure that the 208 Areawide Plan would be implemented:

> "...all proposals for grants for construction of public owned treatment works within the boundaries of the designated area will be consistent with the approved plan and will be made only by the designated management agency."

In addition to the resolutions of intent by local governments, the MAPC signed a memorandum of understanding with the area's largest existing wastewater management agency, the Metropolitan District Commission (MDC) which operates the Metropolitan Sewerage District serving 43 cities and towns in the 208 area. The memorandum defined the relationship of the two agencies in the 208 study, including establishment of a technical subcommittee and a consultant selection committee. It attempted to avoid unnecessary duplication of the MDC's Eastern Massachusetts Metropolitan Area (EMMA) study by agreeing that maximum possible use would be made of EMMA plans, materials and engineering recommendatio It also called for 208 incorporation of the conclusive recommendations of the

EMMA study, including the recommended construction program "unless additonal data developed during the 208 study prompts a need for reconsideration and possible modification of those recommendations." The memorandum concluded: "The MAPC and MDC shall jointly recommend the final 208 plan to the Governor."

THE AREAWIDE PLAN

The major product of the MAPC Water Quality Project is the 208 Areawide Plan. It is the Areawide Plan which, when certified by the Governor and the U.S. Environmental Protection Agency, will determine the expenditure of millions of dollars in federal and state water pollution control funds. It is the Areawide Plan which must be implemented by governments at the federal,state, regional and local levels.

The Areawide Plan is the culmination of more than two years of work by MAPC 208 staff and private consultants. The plan presents the conclusions developed in several preliminary reports with a functional and basinwide focus. These conclusions have been arrived at with the advice and criticism of citizens and local officials who participated in an extensive public involvement process described below.

The Areawide Plan differs significantly from the nine Preliminary River Basin Reports which have been published and reviewed in recent months for the North/South, Weymouth, Ipswich, North Coastal, Upper Charles, Lower Charles, SuAsCo (Sudbury, Assabet, Concord), Neponset and Mystic River Basins. The intent of the basin reports and their accompanying handbooks was to present a set of technically feasible alternatives to solve and prevent water quality problems. The basin reports also identified the likely impacts and costs from each of the alternatives in terms of direction, magnitude, duration and significance. The impact categories assessed were:

Legal and Institutional Implications
- legislative
- institutional

Water Quality and Supply Impacts
- ground water

Environmental Impacts
- erosion
- flood control
- drainage
- recharge
- wildlife
- air quality

Social Impacts
- housing
- recreation and open space
- archeological and historical
- aesthetic

Economic/Employment Impacts
- water quality related employment
- manufacturing
- construction
- agriculture

Governmental Impacts
- taxes and assessed valuation
- induced costs or municipal service requirements

Land Use Impacts
- population
- residential land use
- commercial land use
- industrial land use
- transportation

For purposes of comparison, the alternatives were assessed against a "de facto projection", that is a projection of current trends with no action to improve and preserve water quality beyond those already planned.

Some 4500 copies of the basin reports and their handbooks have been distributed to citizens, local officials, city/town halls and main libraries. All of the comments, corrections and opinions expressed in response to the preliminary basin reports have been carefully considered in the preparation of the addenda to the basin reports and in the drafting of conclusions in this draft Areawide Plan.

In addition to the basin reports, the results of staff analysis and public comment on the 208 stormwater, septage, industrial and management reports also were used in the development of recommendations in this plan.

PLAN FORMAT AND USE

To fully understand and use the Areawide Plan, it is important to be aware of several factors regarding the plan's data base, map scale and format.

- The data used in the Areawide Plan is the latest available to the MAPC. The population figures and projections, land use zoning, regulation and other information were reviewed and verified with citizens and officials of the participating communities in 1976 and again, in 1977, through review of the preliminary basin reports. All errors or changes which would influence a conclusion in the Areawide Plan were considered prior to the preparation of the plan. If any errors remain or if significant changes have occurred, such as a major zoning revision, please contact the Water Quality Project as soon as possible.

- Note that the Areawide Plan is for a 20 year period. Some of the solutions recommended are needed now, while others are recommended to meet future needs assuming a given level of population growth and/or pattern of land development. The plan will be updated annually and changes in the rate or location of growth or the development of new technology can become a basis for further revision of the recommendations. Actions taken by communities to regulate development which is inconsistent with the environmental capability of the land, may avoid a 208 recommendation of expensive sewering at some future time.

- The Metropolitan District Commission's (MDC) EMMA study was scheduled to have been finalized prior to the writing of the Areawide Plan. The study includes an extensive construction program for the upgrading and expansion of the Metropolitan Sewerage District (MSD) which serves 43 cities and towns in Greater Boston. the initial study has been completed and the 208 staff has had access to its conclusions and much of its supporting material. However, the final decisions on the EMMA study are still in doubt pending completion of an Environmental Impact Statement by the U.S. Environmental Protection Agency. That EIS, which was also scheduled for completion prior to the writing of the draft Areawide Plan, is not yet complete. If it is completed prior to the end of the review period for the draft Areawide Plan, its conclusions will be reviewed and considered for inclusion as appropriate in the final Areawide Plan.

- The maps which are included with this Areawide Plan are intended as approximations of the alternative solutions considered by the Water Quality Project. They are not the official project maps and no attempt has been made to include at that map scale (1":8000') all of the information or even all of the water bodies, considered in the plan. The project's official maps (1":3000') are available for review at the MAPC offices. Even these maps are not immediately applicable for implementation of many of the solutions recommended in the plan, such as the adoption of a new or revised zoning by-law. An intermediate step of application of plan information to a scale appropriate to town level planning may be required. The Water Quality Project has applied to the U.S. Environmental Protection Agency for funds to provide technical assistance to communities to encourage and facilitate the implementation of the plan's recommended solutions.

- A recommendation in the 208 Areawide Plan for construction or expansion of sewers or other sewage treatment facilities does not eliminate the need for a Section 201 study on the local level. It is this 201 study, conducted by an engineering consultant hired by the town and paid entirely with federal funds, that finally determines the size, type, location, timing and cost of any facilities to be built. The 1977 amendments to the Federal Water Pollution Control Act have somewhat changed the eligibility for the newly appropriated federal funds. A discussion of the changes appears in Part 2 section 6 of this draft Areawide Plan.

- The identification of a management agency, especially at the local level, does not mean that the agency should carry out the recommendations of the 208 plan alone and without consultation and cooperation with other bodies. The identified agency is the agency with the authority to implement a given recommendation, but the nature of the recommendation may require a cooperative approach with other boards, departments and committees in that community and/or with the agency's counterpart in neighboring communities. A joint evaluation of the 208 recommendations by each community to determine points of needed coordination among the several local agencies is essential. The chief elected official should see that this evaluation takes place and that a comprehensive approach results.

PUBLIC PARTICIPATION AND LOCAL OFFICIAL INVOLVEMENT

The MAPC 208 public participation program summarized in the following pages was founded on the realization that the implementation of the 208 Areawide Plan depended on its acceptance by affected units of government, and of the acceptability of this plan to the general public and their local officials because of their continued involvement with and input into the project.

An active public participation program sought out every vehicle feasible for providing information to all who would or could provide input to the project as well as to those who would be affected by it. Activities include (but were not restricted to):

- news releases and newsletters
- data depositories (libraries)
- copying facilities
- exhibits (libraries, river revels, Cousteau day, etc.)
- speeches and TV appearances by 208 staff
- workshops and seminars
- task force on public participation
- staff assistance to advisory committees
- development of mailing lists and recruitment of interested readers in 92 communities
- public meetings and hearings (by 208 staff and consultants)
- consideration of citizen views and use of information provided
- 2-3 full time public participation staff members throughout project duration
- public notice of all reports and meetings
- publication and distribution of some 4500 preliminary reports plus superseding addenda and the Draft Areawide Plan
- Advisory Committees (TSC, CAC, APAC, PPTF)
- Watershed Association contracts

MAPC has worked continuously to provide clearly defined channels through which interested citizens could communicate with 208 staff to develop a comprehensive public participation program with defined responsibilities for actively carrying out this program; to provide adequate funding (approximately $294,000 to Jan.'78.) to insure active public participation throughout each phase of the planning process and to be responsive to all interested citizens, but not dominated by any single person or interest group.

Throughout the nine basins into which the 92 communities were divided, three series of citizen and local officials workshops were held early in the project which provided opportunity for the 92 project communities to input town data to MAPC staff directly. Some 150 meetings were held subsequently to gather addition technical data by MAPC consultants in the SuAsCo & Upper Charles Basins for exampl

Local officials in most of the 92 communities contributed advice and later verified data used by staff to develop nine preliminary basin reports, the septage management report and the management alternatives report. All local officials and interested citizens were urged to read and respond to the preliminary reports. Some 4500 basin reports were distributed throughout the nine basins to elected officials and each town board and to recruited and volunteer readers in each of the 92 cities and towns. To date, only about half a dozen towns (of 92) have not responded to these reports.

Approximately 800 interested citizens and local officials attended public meetings held in each basin. Comments, questions, new and corrected data from the basin meetings were incorporated into addenda to the preliminary basin reports. The addenda and basin reports were submitted, as "second drafts" for formal state review to the DEQE for their recommendations and simultaneously to the Executive Director/Executive Committee for their reviews. Copies of the addenda were also provided to involved citizens, local officals, and the 208 advisory committees. It is those addenda which superceeded the preliminary reports which the staff used to develop this draft Areawide Plan.

ADVISORY COMMITTEES

Pursuant to Section 208 (a)2, grant regulations for Section 208 (40 CFR 35, subpart F) made provision for including representatives of the state and the general public on an Areawide Planning Advisory Committee (APAC). The MAPC established APAC early in the project as a policy advisory committee to advise MAPC during the development of the Areawide Plan on broad policy matters, including the fiscal, economic, and social impacts of the plan. APAC has met with staff at the 208 offices on an approximately monthly basis throughout the project and has reviewed and provided comment on each 208 document produced. Membership includes representatives from U.S. EPA-Region I, the state (DEQE), local elected officials, representatives from environmental interest groups, the Citizens' Advisory Committee, and interested citizens.

A Technical Advisory Committee (TSC) was established at the beginning of the project which assumed responsibility for formal action upon a plan of study including work elements, agency task assignments, consultant assignments, and 208 fund allocations to elements in accordance with EPA guidelines. The approval and advice of the technical subcommittee was sought during the execution of the plan of study and will be sought in the final plan selection. Representatives include members from the EPA, state (DEQE) and MDC. The TSC has met approximately monthly throughout the 208 project.

MAPC also established early in the project a Citizens Advisory Committee (CAC) composed of interested citizens and special interest groups who review and comment on technical and management staff reports, the comments of citizens on the planning process, and the public participation efforts. The CAC meets bi-monthly and has made a large contribution in its careful review of and commentary on the preliminary basin reports.

MAPC established a Public Participation Task Force (PPTF) in the earliest phase of the project. The task force early on worked diligently with 208 staff on issues such as: identification of water quality problems and priorities for resolving these problems; relative importance of water quality goals in relation to other community goals, the role that water quality management could or should play in achieving community goals; the use of land use controls and a regional approach to waste treatment to protect water quality; the use of land disposal and other innovative or controversial pollution control technologies.

To maximize the base of already environmentally aware citizens, the MAPC entered into contracts with the five existing watershed associations within the 208 area. Some $69,000 has been used to date for broader public participation activities through use of services of:

- Charles River Watershed Association
- Neponset Conservation Association
- Mystic River Watershed Association
- North and South Rivers Watershed Association
- SuAsCo Watershed Association

Additionally, through the year long efforts of a full time 208 staff public participation person, the Ipswich River Watershed Association was strengthened and exists today independently of MAPC. Approximately 20 APAC, 20 TSC, 40 CAC, 20 PPTF meetings have been held to date. About 60 informal meetings have been held between staff members and interested association representatives. We are confident that the MAPC public participation program has fully complied with and surpassed all requirements for public participation for this project. The level and quality of this participation has greatly influenced the plan's conclusions. The legal requirements of the Act are summarized below.

LEGAL REQUIREMENTS

Section 101(e) of the Act states:

> "Public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan or program established by the Administrator (of EPA) or any State under this Act shall be provided for, encouraged, and assisted by the Administrator and the States."

The Environmental Protection Agency has published regulations specifying guidelines for public participation in water pollution control efforts. These regulations (40 CFR 105) require efforts such as:

- provide technical information at the earliest practicable times and at places easily accessible to interested or affected persons and organizations;
- have standing arrangements for early consultation and the exchange of views with interested or affected persons and organizations on development or revision of plans, programs or other significant actions prior to decision making;
- maintain a current list of interested persons and organizations to be notified, when appropriate;
- develop procedures to insure that information concerning water programs, when submitted by citizens, will receive proper attention;
- provide full and open information on legal proceedings under the Act;
- provide opportunities for public hearings on proposed regulations and whenever there is sufficient public interest in a matter.

CERTIFICATION/PLAN APPROVAL PROCESS

This draft Areawide Plan was developed from public review and comment on nine preliminary basin reports, their addenda, the Areawide Septage Treatment Management Plan, and the Areawide Water Quality Management Alternatives Report. The areawide waste treatment management plan alternatives were reviewed in their preliminary stages and it is herein assumed that each of the surviving alternatives presented, if implemented, would meet all regulatory requirements and comply with the appropriate goals and objectives within specified limits of technical reliability. The MAPC is responsible for conducting public meetings on this draft plan and for making modifications to the Areawide Plan based upon that review.

MAPC is required to provide the governing bodies of local governments having responsibility for, or which would be directly affected by, implementation of the plan and having jurisdiction in the planning area, an opportunity to comment on the Areawide Plan and proposed management agency (ies) and make recommendations for approval or disapproval. In the event that a local unit of government fails to respond within 30 days of receiving the request, MAPC may consider that the plan has been favorably recommended by that unit of local government. The Final 208 Plan Review Questionaire (from DEQE) will be distributed with the Areawide Plan to the Chief Elected Official of each municipality for his/her response.

All local comment, whether favorable or unfavorable, will be forwarded to the Governor. The local comments are also to be forwarded to the EPA Region I Administrator when the plan is submitted to EPA by the state.

STATE

Subsequent to the initial 60 day public review, the staff is responsible for responding to recommendations/deficiencies on the draft plan. The state lead reviewing agency (DEQE) and other relevant state agencies will then review the plan prior to the necessary certification of approval by the Governor. The purpose of the state's review is to determine whether:

1) the plan is in compliance with the provisions of the state program prepared under Section 106 of the Act and will then be accepted as a detailed portion of the state plan when approved by EPA;
2) implementation of the plan will enable meeting the 1983 goals of the Act;
3) the plan is in conformance with Sections 201, 208, and 303 of the Act;
4) the plan is in conformance with other applicable regulations.

DEQE will send the Areawide Plan to the Chief Elected Officials for a 30 day review and response period of the cities and towns. A DEQE questionnaire to help focus the responses will be included. Based on the state's review of the plan and the responses received from local governments, the Governor must then determine whether to approve or disapprove the plan. Local governments which disapprove certain elements of the plan must stipulate why they disapprove and what they want to see changed.

If the Governor approves the plan, he must then forward it to the EPA Region I Administrator with his certification of approval and proposed designation of management agency(ies). The Governor must also forward the recommendations received from the local governments. If no certification of approval can be issued by the Governor due to failure of the plan to meet one or more of the above provisions, the Governor must notify the EPA Region I Administrator and the MAPC that the plan is deficient and specify how the plan is to be modified so that it may receive state certification of approval.

The state (DEQE) will be utilizing an element-by-element certification process to evaluate those recommended 208 elements to be included in the state-wide plan. The Governor may certify some elements of the Areawide Plan and withhold certification of others until state-wide plan modifications are made. Examples of questions to be asked of state agencies and the Chief Elected Official in each town in their "Final 208 Plan Review Questionnaire" include:

Non-Point Sources: Subsurface Sewage Disposal

Do you believe the assessment of pollution from subsurface sewage disposal systems (septic tanks) is adequate?

Yes ________ No ____________

If no, please elaborate.

Do you concur with the recommended solutions?

Yes ________ No ___________

If no, please elaborate:

Will you support and work toward the implementation of the recommendations contained within this element?

Yes ________ No ___________

Environmental, Social, Economic Impact Assessment

Do you feel the Environmental Impact Assessment adequately evaluates the:

	YES	NO
Plan Implementation Schedule?	___	___
Effectiveness of the Plan in meeting water quality goals?	___	___
Direct costs of the Plan?	___	___
Indirect Costs (social, environmental, secondary economic impacts, etc)?	___	___
Are there any other impacts which should have been considered? Please elaborate.	___	___

All certified elements from the separate 208 planning programs in Massachuse will form the statewide approach to that element and will be the basis for a statewide determination of priorities. The certified 208 plan elements will be incorporated as part of the Statewide Water Quality Management Plan and will also be used to evaluate the consistency of other statewide programs with the 208 program.

FEDERAL

The EPA Region I Administrator will be responsible for plan approval.

Approval of the plan will be based upon: (1) the state's certification of approval and proposed designation of management agency(ies); and (2) EPA's review of the plan submission to determine that it fulfills the four previously listed (state) requirements. State and local comments and recommendations will also be considered. EPA will not approve any plan in the absence of proposed designation of management agency(ies).

Within 120 days after receiving the plan submittal, the Region I Administrator must:

1) notify the state and the MAPC of approval of the plan and the proposed management agency(ies) designation; or
2) notify the state and the MAPC that the submittal is deficient in one or more aspects and specify the ways in which the submittal must be modified to receive EPA approval. EPA must also specify the time period allowed for the modifications; or
3) notify the state and MAPC that the designation of waste treatment management agency(ies) cannot be approved due to failure to meet the requirements set forth in Section 208 (c) (2) of the Act, thereby delaying further consideration of the plan until the deficiencies are remedied. EPA must also specify the time period allowed for correcting the deficiencies.

ANNUAL CERTIFICATION OF CONSISTENCY

After the plan has been approved, it must be certified annually by the Governor or his designee (DEQE) as being consistent with applicable basin plans. The management agency(ies) should initiate the annual certification process. After receiving certification, the plan must be submitted to the Region I Administrator for approval. If the governor fails to certify, notification should be given to the EPA Region I Administrator and the management agency(ies) explaining modifications necessary to receive certification.

COMMUNITY ROLES

You are urged to participate further in the development of the Areawide Plan by reading and commenting on this draft document. MAPC encourages each of you to participate in the public hearings to be held on this draft approximately two months from now at that location most convenient to you. We request that you forward a copy of your comments to be made at the public hearing to your chief local offical for his or her consideration as well as to the MAPC staff.

EIS

This document is both a draft Areawide Plan and a draft Environmental Impact Statement. The MAPC 208 staff assessed a full range of natural, economic, social, institutional, developmental and other impacts of the alternatives presented in its nine preliminary basin reports. The recommended solutions in this draft Areawide Plan were reached after careful consideration and public review of these alternatives and their likely impacts. The recommended solutions in this document were themselves evaluated in the same impact categories and the results were broken out to show the likely impacts at the individual community level. The evaluation process and the process of public review of this document were designed to be consistent with both the 208 review and certification requirements and the requirements of the National Environmental Policy Act (NEPA).

PART I, SECTION 1

THE MAPC 208 AREA

In this section you will find:

A description of the MAPC's 208 planning area including its present and future:

A. Population

B. Employment

C. Land Use

A. POPULATION

The MAPC "208" area encompasses 92 of the cities and towns in the Boston Metropolitan area. This area includes 9 major river basins: the North-South, SuAsCo, Ipswich, North Coastal streams, Weymouth, Neponset, Mystic, Upper and Lower Charles. These river basins and communities are highly diverse, although a general typology can be made at the basin level. Within older, highly urbanized basins - the Lower Charles and Mystic River basins - many of the communities have been centers of residential and economic activity dating back to the Industrial Revolution and some to colonial times. These basins also contain communities that were among the earlier, or pre-World War II suburbs to be developed, since many communities are within easy commuting distance to the employment, shopping, and cultural opportunities found in Boston. Over the 1950-1970 period, the older urban centers in these basins generally experienced relatively large losses of population, while the inner suburban communities tended to remain stable over this period.

Other communities within the Lower Charles and Mystic River Basins are newer, post-World War II suburbs that grew rapidly in the wake of the construction of Route 128, in keeping with the national trend of movement of population outward from older urban areas. Many of the communities in the Neponset, Weymouth, Ipswich, and North Coastal Basins could also be classified as post-World War II suburbs. In general, such communities tended to experience rapid growth over the entire 1950-1970 period, although the rate of growth experienced over the 1950-1960 decade was considerably greater than the rate of growth during the latter decade.

The less-urbanized basins of the 208 area are the North-South, SuAsCo and Upper Charles River Basins. Many of the towns in these basins are suburban or semi-rural in character. In terms of population, these communities are relatively small and so a relatively small numerical increase in population appears as a large percentage increase. Due to their large supplies of comparatively lower-cost land available for development, many of the communities in the less-urbanized basins are now experiencing population increases and some are relying heavily upon strict land use controls in order to retain their perceived semi-rural character.

As presented in Table I-1, population within the 208 area as a whole increased 17.0% over the 1950-1970 period, from roughly 2.5 million people in 1950 to roughly 2.9 million people in 1970. The majority of this increase occurred over the 1950-1960 decade, with the 1960-1970 decade one of relative stabilization areawide.

A look at the population in each river basin reveals differences from the areawide pattern. Between 1950 and 1970, population was shifting away from the highly urbanized basins of the study area and into the newer suburban and more rural basins, with the bulk of this shift occuring between 1950-1960. Between 1950 and 1970, the North-South, Ipswich, Upper Charles, and SuAsCo River Basins each more than doubled in population. The Weymouth, Neponset and North Coastal Basins experienced more moderate increases; the Mystic River Basin had only a small increase in population and the Lower Charles Basin (which includes Boston) lost population between 1950 and 1970.

Population projections developed by the staff indicate that the 208 area as a whole will experience about a 11 percent increase in population over the 1970-1995 projection period, which is a lower rate of increase than that experienced over the previous twenty-year period.

Within individual river basins, the population projections indicate that the population trends of the 1950-1970 period will generally continue although at a slower rate in most communities. The North-South, Upper Charles, and SuAsCo River Basins will continue to be the fastest growing basins in the area over the 1970-1995 period. However, each of these basins is projected to increase in population at less than half the rate experienced over the previous twenty-year period. Similarly, the Weymouth, Ipswich and Neponset Basins are expected to experience moderate increases in population, again at rates considerably below those of the previous twenty-year period. Small increases in population are projected for the North Coastal and Lower Charles Basins. In the Lower Charles, declines in population experienced between 1950-1970 are expected to be reversed somewhat in years to come. Only the Mystic River Basin is expected to show a slight population decline by 1995 as the older urbanized communities such as Arlington, Chelsea, Everett, Revere and Somerville are expected to lose population between 1970 and 1995.

B. EMPLOYMENT

In terms of economic activity, the 92 communities in the 208 study area are a diverse lot. The study area includes some of the oldest and most densely developed areas on the East Coast which have been employment centers since the early 1900's; industrial cities and towns that have been the location of large mills since the 1800's; suburban towns that have attracted large amounts of both residential and economic development since the 1950's; and predominantly rural communities where economic activities are primarily oriented toward serving the town residents. Historically, the first economic activities in this region were started along the edge of Boston Harbor, supporting the shipping industry that provided access for New England with the rest of the world. As the process of industrialization proceeded through the 19th century, Boston, as the largest city in New England, became the financial center of the six-state area.

TABLE I-1

AREAWIDE POPULATION TRENDS AND PROJECTIONS

1950 to 1995

River Basins*	1950(1)	1960 (1)	% Δ '50-'60	1970(1)	% Δ '60-'70	% Δ '50-'70	PROJECTIONS (2) 1975	1980	1985	1990	1995	% Δ '70-'95
NORTH-SOUTH	27,291	46,938	72.0	73,409	56.4	169.0	85,200	93,600	100,700	107,200	111,300	51.7
WEYMOUTH	87,612	137,063	56.4	164,230	19.8	87.4	172,800	182,650	191,400	200,100	207,400	26.3
IPSWICH	37,453	68,272	82.4	92,377	35.3	146.8	97,700	106,300	113,900	120,400	124,700	35.0
NORTH COASTAL	280, 479	316,863	13.0	346,910	9.5	23.7	337,100	345,000	355,300	362,800	369,300	6.4
SUASCO	97,187	153,890	58.3	220,201	43.1	126.6	238,700	258,950	276,500	292,300	306,450	39.0
UPPER CHARLES	53,188	69.646	30.9	106,472	52.9	100.2	117,000	127,100	137,000	148,200	155,600	46.0
MYSTIC	489,442	503,094	2.7	513,021	2.0	4.7	487,700	485,500	490,000	497,900	506,600	-1.3
NEPONSET	160,997	202,273	25.6	229,796	13.6	42.7	239,700	251,500	261,500	271,000	279,700	21.7
LOWER CHARLES	1,273,639	1,220,720	-4.2	1,186,675	-2.8	-6.8	1,174,600	1,180,700	1,187,300	1,200,000	1,207,700	1.8
208 AREA	2,507,268	2,718,759	8.4	2,933,091	7.9	17.0	2,950,500	3,031,300	3,113,600	3,199,900	3,268,750	11.4

* Basin subtotals include those communities discussed in the basin report and do not necessarily include all communities which drain into the river basin.

1) U.S. Census

2) CTPS Population Projections

Generally, economic activities have developed in several centers around the urbanized core of the region. The bulk of the region's employment is still concentrated in these core areas, of which Boston is the primary community. Most of the employment in the 208 area is centered in the communities comprising the Lower Charles Basin (which in 1975 accounted for approximately 59% of the region's jobs.) The City of Boston alone accounted for more than 35% of the region's jobs in 1975. Other major employment centers include Cambridge with about 85,000 jobs, Waltham with about 53,500 jobs, Lynn with 41,600 jobs, Newton with nearly 37,000 jobs, Quincy with about 35,000 employed, Framingham with nearly 29,000 jobs and Somerville with about 20,000 employed.

Some of these older cities, while not located directly in the core of the region, have attracted large amounts of employment, primarily in the industrial sector. Others include Peabody, Lynn, Salem and Malden on the North Shore and Watertown to the west of Boston, and Quincy on the South Shore. In the communities where economic development has been facilitied by the construction of major highways (notably Route 128) in the 1950's, the development of the manufacturing sector has generally been matched by the development of the trade sector serving the substantial new residential development in these communities. These towns include Beverly and Danvers on the North Shore, Bedford, Burlington, Framingham, Natick, Waltham and Woburn to the north and west of Boston, Needham and Dedham to the southwest, and Braintree on the South Shore.

Generally, in the region as a whole, the manufacturing and services sectors account for the most jobs, representing 21 and 23% of the area's total employment respectively. Most of the manufacturing activities are located in the core areas and older industrial communities identified above, although firms have been moving from these areas to the new industrial parks abutting Route 128 since the late 1950's. Basins with a large proportion of employment in the manufacturing sector are the Ipswich Basin and North Coastal Streams area, with 30% and 28% of employment, respectively, in manufacturing in 1975 (primarily due to the influence of the older industrialized cities of Salem, Peabody and Lynn), the SuAsCo River Basin, with 36% of employment in this sector in 1975 (these jobs are primarily located within the Route 128 - influenced towns of Bedford, Burlington and Framingham which have become major manufacturing centers in the region); and the Upper Charles River Basin, with 31% of total employment in manufacturing in 1975 (while these jobs are primarily in the towns of Ashland, Milford and Walpole, there are relatively few jobs in this Basin overall, so that a few larger firms have skewed the entire distribution for this basin.) The basins in which manufacturing activities account for such a large proportion of the area's employment are generally those that are presently experiencing pressures for development, or those that have developed since the 1950's. This reinforces the trend for manufacturing activities to leave the inner core areas for more spacious areas where the costs of development and expansion are not as great. Trade activities seem to be fairly distributed among the different basins; while Boston contains more jobs in this sector than any other community, the development of shopping centers in suburban communities (especially around Route 128) have kept pace with the development of manufacturing activities in these areas. The prototype for this type of shopping center was built in Framingham (Shopper's World on Route 9) in the early 1950's. The first suburban trade development took place along major highways: Route 9 to the west of Boston and Route 1 to the north. The second generation of suburban shopping center develment has taken place around Route 128. This includes major regional shopping malls built in Danvers on the North Shore, Burlington to the north of Boston, Natick to the west, and in several towns on the South Shore. This construction has been facilitated in the South Shore area by the extension of the MBTA Red Line to Quincy Center.

It should be noted that Boston and the core cities are still the location of much of the region's service-oriented activities, including finance, insurance, real estate and government activities, as well as the usual personal and business services. Overall, these activities together accounted for 27% of the region's total employment in 1975. While this is partly due to Boston's position as the financial center of New England as well as the capital of Massachusetts, this can also be attributed to the overwhelming influence of the area's colleges and universities that are mostly located within these "core" communities. It should also be noted that, while many of these institutions are located in the region's central cities, many of their "spin-off" research and development firms have moved to the areas around Route 128.

As could be expected in an urbanized region, agriculture and mining do not play important roles in the region's economy, although these activities are represented in a small degree. Agricultural activities (including fishing as well as farming) are primarily found in the outlying communities in the region. Mining consisting primarily of sand and gravel operations and a small granite quary, is found in the North and South Shore areas.

Preliminary projections of economic activity developed by the Central Transportation Planning Staff indicate that, by 1995, overall employment in the region is expected to increase by 33% over 1975 levels, from 1,319,064 jobs in 1975 to 1,757,000 jobs in 1995. This represents a moderate rate of growth for this region (as for New England in general) over this twenty-year period, and reflects the overriding character of the region as an intensively developed urbanized area. Within the region, the outlying suburban and rural areas are expected to bear the largest part of this projected growth. At the basin level, the basins that cover the most industrialized and heavily developed communities can expect their employment levels to grow moderately over this twenty-year period, while the basins covering the outlying communities are expected to grow rapidly in terms of employment. Specifically, in the Mystic, Lower Charles, North Coastal and Neponset River Basins, total employment is expected to increase by about 30% while total employment in the other basins is expected to increase between 40 and 85 percent by 1995. (See Table I - 2)

Existing and projected employment in manufacturing activities is of particular interest for 208 water quality planning purposes. In addition to the sanitary wasteflows and runoff from paved areas that are associated generally with urban land use, certain manufacturing activities often use large amounts of water in their industrial processes. The volume and type of industrial wasteflows associated with these activities may be sufficient to require both the pre-treatment of industrial wastes and also wastewater collection, treatment and disposal, frequently accomplished via tie-in to municipal collection and treatment systems. For the purposes of this study, manufacturing activities have been divided into three classifications based upon the amount of water used per employee: 1) Dry Manufacturing, or those activities with an average per employee water usage of 170 gallons per day; 2) Wet Manufacturing, or activities using an average of 700 gallons per day; and 3) Very Wet Manufacturing, or activities whose water useage averages 2,000 gallons per employee per day.

TABLE I-2

AREAWIDE EMPLOYMENT PROJECTIONS

BY SECTOR 1975-1995

SECTOR	1975 Employment	% Total Employment 1975	1995 Employment	%Total Employment 1995	% '75-'95
Agriculture, Forestry, Fishing	9,755	0.7	5,503	0.3	-43.6
Construction	42,231	3.2	73,724	4.2	74.7
Transportation, Communications, Utilities	65,122	4.9	97,224	5.5	49.3
Wholesale & Retail Trade	271,731	20.6	357,990	20.4	31.9
Finance, Insurance, Real Estate	86,060	6.5	125,392	7.1	45.7
Services, Mining	293,868	22.2	536,921	30.6	82.8
Public Administration (Government)	181,693	13,8	241,428	13.8	32.9
Non-Classified Establishments	88,800	6.7	74,131	4.2	-16.5
Manufacturing	279,804	21.2	244,700	13.9	-12.6
TOTALS	1,319,064		1,757,000		33.2

Source: CTPS Forecasts, 1976

Table I-3 indicates that about 280,000 people were employed in the manufacturing sector in the 208 study area as a whole in 1975, or approximately 21% of the region's total employment. Of these workers, approximately 73% (or 202,935 people) were employed in dry manufacturing activities, 27% (or 74,314 people) were employed in wet manufacturing activities, and about 2% (or 2,555 people) were employed in very wet manufacturing activities. The Lower Charles River Basin contains the most jobs in this sector of any basin in the study area (128,747 people were employed in manufacturing in 1975). Boston, Waltham and Cambridge all together accounted for about 35% of the region's manufacturing activities, and these three cities contained more firms than any of the other communities in the study area. A substantial number of manufacturing jobs were also found in the older urban cities of the region representing a wide range of products: Quincy on the South Shore, 13,759 people were employed in 1970, and 3,000 of these were employed by one ship builder, and on the North Shore, employment in Lynn, Peabody, and Salem totalled 32,746 in 1970. Major employers in 1974 in these North Shore cities were two General Electric Plants in Lynn (employing together 9,000 people), the leather industry (tanning and finishing) in Peabody, and a G.T.E. Sylvania plant in Salem (employing 1,000 people.) In addition, several suburban communities around Route 128 provided locations for large plants: In 1974, the Raytheon Company employed more than 10,000 people in Bedford and a General Motors plant and two computer development companies together employed more than 6,000 people in Framingham.

In the Lower Charles River Basin, these jobs are generally in a wide variety of relatively small firms, and most (especially those located in Boston) are in areas served by the Metropolitan Sewerage District. In other areas, water-intensive jobs are in sections of the food processing industry and the paper industry. These are the firms (and employees) that will probably experience the most direct impacts from water quality recommendations resulting from this 208 project. However, these impacts will generally be minimized over the entire region, as most of these firms are located in areas which are already served by sewerage systems.

C. LAND USE

Development within the 208 area is most heavily concentrated within an arc extending some 15 miles from the City of Boston, roughly bounded by the circumferential highway, Route 128. The pattern of land use development for the MAPC 208 area is typical of many metropolitan areas, an intensely developed urban core, with development decreasing in density further from the core. For the 49 communities for which data on the current supply of land is available, of the 24,975 total acres of land within those communities, approximately half is either presently developed or else pre-empted from development, in the form of public or semi-public open space, deed restricted wetlands, waterbodies or conservation zoning districts. The remaining half, 266,619 acres, is presently available for future development.

The pattern and intensity of land use within the 208 area changed significantly between 1951 and 1971 following changes in the level and distribution of population and employment. Over that 20-year period acreage in residential, commercial and industrial use increased 43% and 38% respectively or from approximately 169,000 residential acres in 1951 to 241,000 acres in 1971 and from roughly 23,000 commercial-industrial acres in 1951 to 39,000 acres in 1971. At the same time as these "urban" type land uses increased, forest and agricultural land use has decreased. Forested acreage dropped 11% since 1951 from 374,000 acres to 331,000 acres. Agricultural land decreased 56%, from 140,000 acres in 1951 to 62,000 acres in 1971.

TABLE I-3

AREAWIDE MANUFACTURING EMPLOYMENT FORECASTS 1995

RIVER BASINS*	1975							1995						
	Total Mfg.	Dry Mfg.	% Dry	Wet Mfg.	% Wet	Very Wet Mfg.	% Very Wet	Total Mfg.	Dry Mfg.	% Dry	Wet Mfg.	% Wet	Very Wet Mfg.	% Very Wet
NORTH-SOUTH	2,630	1,903	72.4	727	27.6	0	0	4,050	2,957	73.0	1,091	26.9	2	0.1
WEYMOUTH	24,278	14,113	58.1	9,973	41.1	192	0.8	26,450	15,398	58.2	10,315	39.0	741	2.8
IPSWICH	24,043	17,320	72.0	6,723	28.0	0	0	23,850	15,248	63.9	8,596	36.0	6	0.1
NORTH COASTAL	49,325	29,991	60.8	19,291	39.1	43	0.1	45,160	26,322	58.3	18,740	41.5	98	0.2
SUASCO	43,090	35,406	82.1	7,560	17.5	124	0.3	46,600	38.182	81.9	8,083	17.4	339	0.7
UPPER CHARLES	10,237	6,878	67.2	2,543	24.8	816	8.0	11,550	8,096	70.1	2,166	18.7	1288	11.2
MYSTIC	68,398	48,650	71.1	19,632	28.7	116	0.2	52,550	39,217	74.6	13.042	24.8	291	0.6
NEPONSET	83,223	59,260	71.2	21,852	26.3	2111	2.5	74,370	50,027	67.3	20,391	27.4	3952	5.3
LOWER CHARLES	128,747	100,325	77.9	26,975	21.0	1447	1.1	94,450	74,018	78.4	17,654	18.7	2778	2.9
208 AREA	279,804	202,935	72.5	74,314	26.6	2555	1.9	244,700	174,901	71.5	64,742	26.5	5057	2.0

* Basin subtotals includes all communities which drain into river basin and therefore area total is sume of 92 communities and not of the basin totals.

SOURCE: CTPS Employment Forecasts

Land use has exhibited more dramatic changes. The SuAsCo River Basin has experienced the largest increase in residential use, over 25,000 new residential acres. Most of the increase is due to the construction of new single family homes, although apartment development has become somewhat important in the past ten years. Commercial and industrial growth occurred in all river basins. However, the Lower Charles River Basin had the greatest increase in this type of development between 1951 and 1971, with this growth partially attributable to the construction of Route 128. Because of this expansion in "urban" land uses, it is not surprising that all river basins have had decreases in forest and agricultural land uses. Forest acreage in the Neponset River Basin has declined by over 10,000 acres and forested land in all river basins decreased by at least 5,000 acres. Almost half of the decrease in agricultural acres between 1951 and 1971 has occurred in the SuAsCo River Basin alone. It has lost almost 32,000 acres of farmland and open space. Aerial photographic maps developed in 1971 (MacConnell U Mass) show 40.8% of the 208 area land is forested, 7.6% is agricultural or open space and approximately 7% is wetlands. "Urban " land occupies roughly 40% of the areawide acreage. Residential land covers almost 30% of the total 208 area. The remaining 10% of urban land is developed by industry - 2.3%, commerce - 2.5%, transportation - 4%, and mining and waste disposal -1%.

The individual river basins exhibit significant differences from the areawide averages and from other basins. Two basins stand out among the nine as being highly urban in character. They are the Mystic River Basin and the Lower Charles River Basin. These two basins each have higher residential, commercial, industrial and transportation land use percentages and lower forest and agricultural and open space land use percentages than the 208 area average. Mystic River Basin has the greatest percentage of land devoted to residential (42%) of all the basins.

Three other river basins - the Weymouth, the Neponset and the North Coastal - have characteristics of basins surrounding urban centers. They could be classified as inner-suburban. These three basins have intensive residential developments that provide homes for thousands of commuters employed in Boston and vicinity. The percentage of land devoted to each of the land uses in these basins is very similar to the percentages for the study area land uses.

Rural/suburban would best describe the remaining four basins - the SuAsCo, North-South , Upper Charles and Ipswich. These basins have a majority of their land forested and a significant percentage farmed. People residing in these basins are less dependent upon Boston for employment opportunities and shopping convenience than the inner suburban basins.

Urban land uses in the study area generally are found in those areas best served by major transportation routes and for the most part, concentrated within areas that have already been sewered. Over the past 20-year period, the area's Boston-oriented radial highway network and the circumferential highways, Routes 128 and I-95 have facilitated the post-World War II movement of residential, industrial and commercial activities away from the core communities. Radial highways to the north including Route 1 and the comparatively recent Interstates 95 and 93 have facilitated the development of the Ipswich-North Coastal and Mystic River Basins. Route 3, the extension to the Southeast Expressway, has improved accessibility to the South Shore (Weymouth and North-South River Basins) and has helped to attract residential development, industry, and retail trade in the form of shopping malls. New development to the southwest of Boston, in the Neponset River Basin has similarly been facilitated by accessibility provided via Routes 1, 24 and 28, and by Route I-95, constructed in the early 1960's. Development to the west of Boston, the Lower Charles and SuAsCo River Basins in served by Routes 2 and 9, and by the Massachusetts Turnpike Extension.

Two circumferential highways, Routes 128 and 495, have facilitated extensive changes in the land use patterns of the region over the past 20 years in terms of the location of residential and economic development. Their primary purpose is to provide lateral traffic movement between the major north-south and east-west highways. The older of the two highways, Route 128, services the urban and inner suburban river basins around Boston. Industrial developments can be seen along practically every mile of this road. Route 495 was completed in the early 1970's to serve as an outer ring to bring other major cities in eastern and central Massachusetts and southern New Hampshire within reasonable travel time to one another as well as Boston. Within the 208 study area, this highway runs through the Upper Charles and SuAsCo River Basins. At most intersections of 495 with major highways, industrial parks are either in operation or under construction.

Urban land uses also tend to be most concentrated in areas that have since been sewered to service that development. The Metropolitan Sewerage District serves practically all the developed areas in Boston and its immediate vicinity including all of the Boston Harbor area and the majority of the Lower Charles, Mystic, Neponset and Weymouth River Basins. Pockets of development that are served by sewers are also found in the SuAsCo, Upper Charles, North-South and Ipswich-North Coastal River Basins, where many individual municipalities have constucted small sewerage systems to service their town centers.

Another general area of concentrated development is along the coastline. Year-around and seasonal homes line the shores of communities in the Ipswich-North Coastal River Basin to the north of Boston and the Weymouth and North-South River Basins to the south. Beaches are also abundant in these areas. In the Boston Harbor area, industry is the predominant type of development near the water, with tank farms, process plants, and now-vacant naval facilities make up the majority of this land use.

PART I, SECTION 2

USING THE RECOMMENDATIONS FOR LOCAL ACTION

In this section you will find:

- Background information on the recommendations for local action in the 92 cities and towns in the MAPC 208 area. This information is presented here to avoid repetition in each community where a given recommendation is made.

You may choose to read this section now or to return to it as needed for information about each of the recommendations and probable impacts in your community.

Additional background information may be found in the 208 study's preliminary published reports, especially:

- The nine preliminary basin reports and their addenda;
- The Areawide Water Quality Management Report; and
- The technical reports on stormwater management and septage treatment and disposal alternatives.

This section is organized in the same order as the recommendations and assessment categories for each community:

Recommended 208 Plan

I. Wastewater Treatment
II. Stormwater Management
III. Estimated Costs
IV. Industrial Wastewater
V. Non-Point Sources
VI. Preventive Land Use Controls
VII. Management

Impact Assessment Categories:

I. Direct Costs
II. Environmental Impacts
  A. Erosion
  B. Flood Control
  C. Groundwater
  D. Wildlife
  E. Air Quality
III. Social Impacts
  A. Open Space and Recreation
  B. Archaeological and Historic
  C. Housing
IV. Economic Impacts
  A. Manufacturing

I. WASTEWATER TREATMENT

A. The "201" Study

A number of cities and towns in this plan will receive a recommendation to initiate a "201 Study" to evaluate water quality problems and the potential solutions in greater detail than is possible in this areawide plan. A 201 study, while often referred to as a "facilities plan", does not necessarily lead to the construction of sewers and related collection and treatment facilities for wastewater. The study must also evaluate non-structural alternatives to sewering and solutions with limited construction, such as package treatment plants. A 201 study can also evaluate problems and alternative solutions for septage disposal in unsewered or partially sewered communities. Through its selection and direction of a planning consultant and through public participation in the 201 study, the community can strongly influence the direction of water quality solutions. This should result in the choice of a solution that is technically sound, cost-effective, and consistent with the community's desired rate and pattern of future growth.

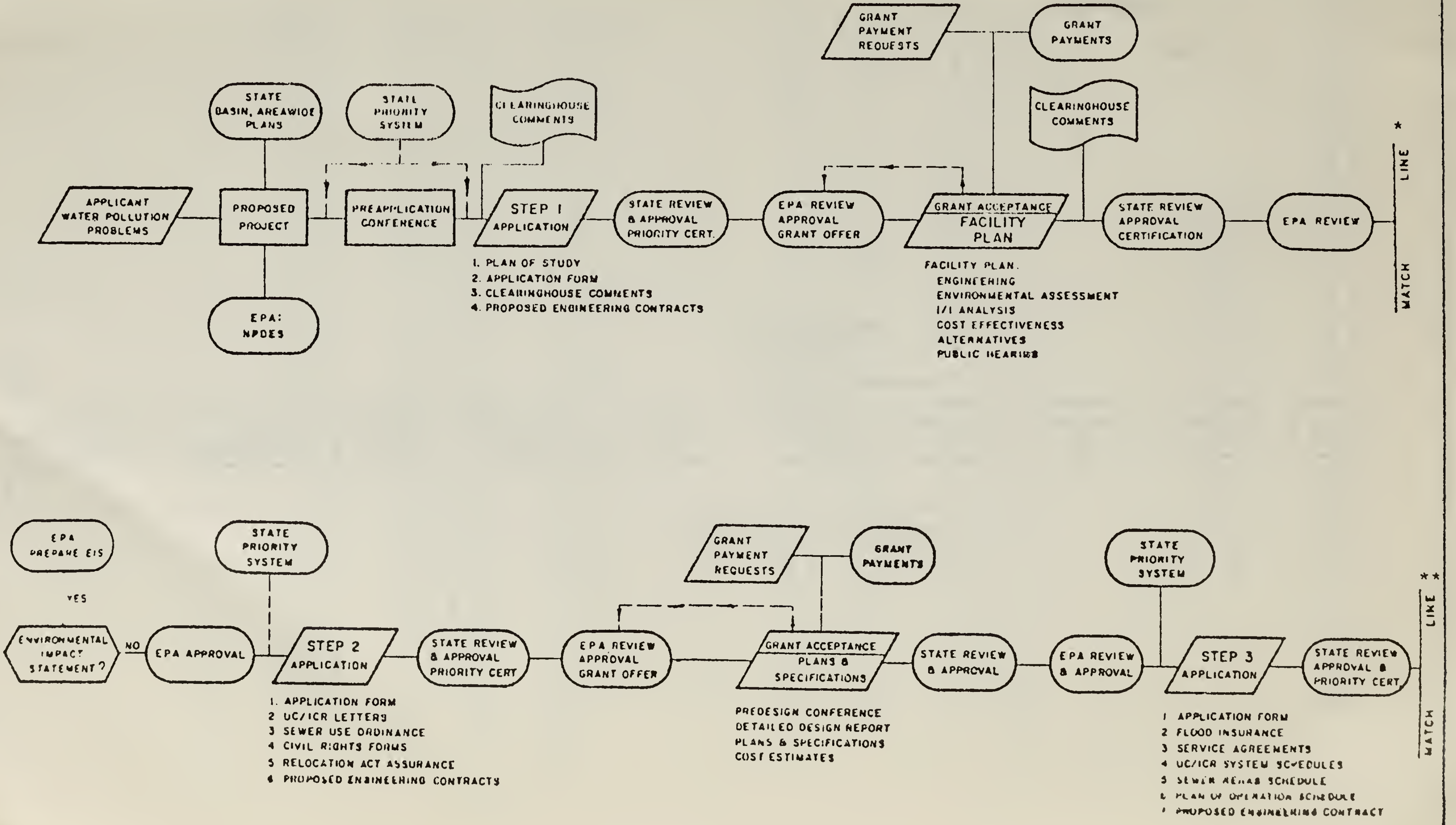
Facility planning, under section 201 of Public Law 92-500, was designed to ensure the orderly development of plans and timely submission of applications for funding of wastewater treatment facilities. Any community wishing to receive federal and state funding for sewerage facilities construction must prepare a study called a facilities plan, Step I, of the 201 planning process.

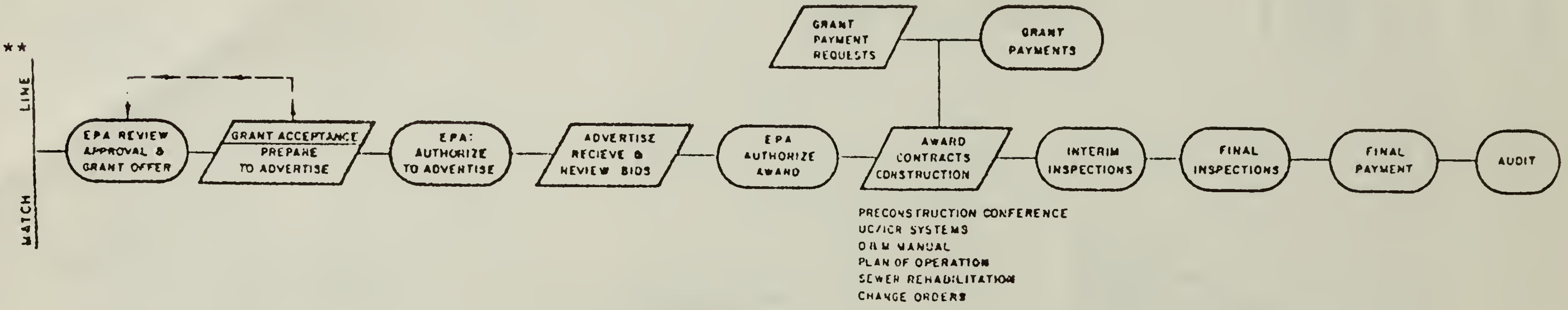
In addition to the basic engineering considerations, facility plans must investigate all potential solutions on the local and regional levels. This includes a cost-effectiveness comparison, an environmental assessment of each alternative and a public participation program to solicit citizen input. Communities with existing sewerage systems are required to submit an infiltration/inflow survey to determine where renovation is needed to ascertain how the extraneous flows can be eliminated. If the Step I study determines that a facility is needed, a community must prepare the detailed plans and specifications for the proposed facility. This Step II study also includes a cost estimate. Step III of the 201 process is the actual construction of the facility (see flow chart of the 201 process).

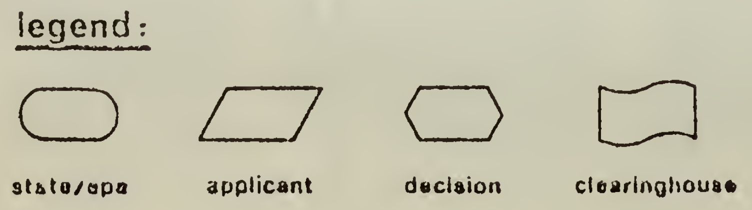
EPA and the state evaluate the facility plans to determine the project's eligibility for funding. Eligible projects must be publicly owned and operated, must be cost-effective, and be capable of meeting effluent limitations as required by the Massachusetts Division of Water Pollution Control. The order of funding for eligible projects is determined by a priority list developed by the state. (Persons interested in a detailed description of the priority list should contact the Mass. Division of Water Pollution Control.) The priority list is based on the type of project and the project's effect on certain uses (i.e., water supply, health, wildlife, recreation). Each step of the process receives a priority number and is funded separately.

Various treatment concepts were presented in this plan's preliminary basin reports. These concepts were generally based on the sewer alternative approach involving maximum and minimum sewer service expansion for the disposal of wastewater. Non-sewer alternatives which usually involve an effective maintenance and inspection program of subsurface disposal systems and may also require rehabilitatio or reconstruction of certain malfunctioning systems were also discussed in the basin reports. A separate report developed alternatives for the disposal and

schematic flow diagram construction grants process







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The following definitions for water quality standards and effluent limitations in Massachusetts will be referred to frequently in the text.

MASSACHUSETTS WATER QUALITY STANDARDS
As Defined by the Division of
Water Pollution Control, May, 1974

Fresh water

Class A - Designated for use as sources of public water supply.

Class B - Suitable for bathing and recreational purposes, water contact activities, acceptable for public water supply with treatment and disinfection, are an excellent fish and wildlife habitat, has excellent aesthetic values and suitable for certain agricultural and industrial uses.

Class C - Suitable for recreational boating and secondary water contact recreation, as a suitable habitat for wildlife and fish indigenous to the region, for certain agricultural and industrial uses, has good aesthetic values, and under certain conditions is acceptable for public water supply with treatment and disinfection.

Salt water

Class SA - Waters of the highest quality and are suitable for any high water quality use including bathing and other water contact activities. Suitable for approved shellfish without depuration, have the highest aesthetic walue and are an excellent fish and wildlife habitat.

Class SB - Suitable for bathing and recreational purposes including water contact sports and industrial cooling, have good aesthetic value, are an excellent fish habitat and are suitable for certain shell fisheries with depuration (Restricted Shellfish Areas).

Class SC - Suitable for aesthetic enjoyments, for recreational boating, as a habitat for wildlife and common food and game fish indigenous to the region, and are suitable for certain industrial uses.

EFFLUENT LIMITATIONS BY SEGMENT CLASSIFICATION

Following the enactment of PL 92-500, the Environmental Protection Agency required all States to classify all the surface waters of every state according to whether base level effluent limitations required under the Act will be sufficient to meet the water quality standards in a particular stream segment. The three classifications, or designations, are defined as follows:

Effluent Limited Segment -

> Any segment where it is known that water quality is meeting and will continue to meet applicable water quality standards or where there is adequate demonstration that water quality will meet applicable water quality standards after the application of required effluent limitations.

Water Quality Limited Segment -

> Any segment where it is known that water quality does not meet applicable water quality standards and/or is not expected to meet applicable water quality standards even after the application of required effluent limitations.

Anti-Degradation Segment -

> Each State must develop and adopt a Statewide anti-degradation policy in the water quality standards, Massachusetts' Anti-degradation Policy is:
>
> > No new discharge is permitted upstream of the most upstream existing municipal discharge. (This policy is enforcable through the general provisions of the Massachusetts Water Quality Standards.)

treatment of septage. The concepts were developed with awareness of the existing pattern of wastewater disposal as well as future possibilities for inter-basin and regional cooperation in wastewater management.

The concepts from the basin reports and the septage management alternatives from the Septage Management Report were carefully examined and evaluated to produce the three concepts in this areawide plan. Comments from most of the 92 communities in the project area also played an essential role in developing these areawide concepts.

Concept I	No Sewers - Septage Treatment
Concept II	Minimum Sewering
Concept III	Maximum Sewering

The concepts are not to be construed as final, definitive alternatives; they are the skeletons of detailed alternatives which can be derived by further study and the active participation of the 92 communities involved. Following is a brief explanation of each of the concepts.

Concept I - No Sewer Alternative. Under this concept, communities which have no public sewers shall continue to rely on subsurface disposal systems. A community under this concept must develop and implement an effective program of septic tank maintenance and inspection. Also, treatment and disposal of septage should be undertaken on a community or regional basis. For communities which are presently only partially sewered, no further extension of the existing sewer system would take place. However, septage disposal in an environmentally sound manner shall be carried out.

Concept II - Minimum Sewering. This concept is designed for the abatement of existing water quality problems only. It assumes that immediate sewer construction plans are not underway in the problem areas. Minimum sewering arrangements generally result in the lowest capital and operational costs. Communities where no existing problems were identified would not need any sewers under this concept. This concept is essentially the same as the minimum sewering concepts in the basin reports except that this concept also involves the implementation of appropriate septage management alternatives for communities with a substantial portion of their population using subsurface disposal systems. Small package plants or communal septic systems wherever applicable are also envisaged under this concept.

Concept III - Maximum Sewering. Under this concept all potential sewer service areas as shown on the potential sewer service area map in each basin report would be sewered. The potential sewer service areas are those with existing water quality problems and those with potential problems as they are developed. This concept envisages the maximum expansion of sewerage facilities and generally entails the highest capital and O & M costs. The expansion and upgrading of existing treatment facilities was considered to be most economical than building new small treatment facilities in most cases.

The Prevention Factor. It would be wrong to view any of these concepts as a full solution to the problem of water quality. To achieve and maintain clean water and to get full value for the current clean-up efforts, it is necessary to take steps to prevent future pollution. These preventive actions include land development controls, water conservation, prevention of landfill leachate pollution and road salt contamination. These actions should be viewed together with the appropriate wastewater treatment concept to form a comprehensive water quality program in each community. The methods of preventing future pollution problems are presented in Part II , section 5 which focuses on solutions to non-point pollution problems and the institution responsible for their implementation.

For a number of communities which rely totally or partly on septic systems and other methods of on-lot disposal systems, the 201 study recommendation refers specifically to evluation of the various means of treatment and disposal of septage. Septage is the residue which collects in septic systems and which must be pumped out periodically to maintain the system and extend its life. This 208 plan considers that sewering is not an answer to all water quality problems. Properly located, installed and maintained, septic systems are environmentally sound and much of the effort of this plan has been devoted to the continuation of on-lot treatment where possible. This effort is consistent with other goals including the desire to avoid sprawl development with its wasteful spread of sewers and other capital intensive infrastructure into rural and thinly developed suburban areas. The maintenance of on-lot systems should not preclude the attainment of worthwhile developmental goals such as economic development and the construction of a full range of residential types. In communities where the maintenance of on-lot systems and appropriate land use controls are recommended, the means of attaining these other goals are also noted.

Communities for which septage treatment is a problem requiring local action, will find a more detailed presentation of alternatives in the MAPC 208 report "Regional Septage Disposal Alternatives in the MAPC 208 Study Area". This report is especially important to the communities which are not members of the MDC's Metropolitan Sewerage District (MSD) and whose contracts to dispose of septage to the MSD will not be continued after 1979.

During the exhaustive public participation process for this plan, all 92 communities were presented with alternative patterns of wastewater management in the year 1995. A number of suburban and rural communities rejected the possibility that their towns might be sewered or partially sewered if current trends continued in population growth and land use. In many of these communities the use of on-lot systems and the avoidance or substantial limitation of sewering is still possible. But, action by the community will be required to make the continued use of on-lot systems a reasonable alternative into the future. These needed local actions are identified in this plan. They are aimed at the achievement and maintenance of water quality through non-structural means including the proper location, installation and maintenance of on-lot systems and the protection of environmentally critical lands through land use controls on the type and density of development. Progress in adopting these non-structural techniques will be evaluated in the annual updates of this 208 plan. Failure to act on these non-structural recommendations and a resulting degradation of surface or groundwater is likely to lead to a future recommendation for solutions involving unwanted sewering.

B. Maintaining On-Lot Systems

In many communities served by on-lot sewage disposal systems, the recommendation is made that a rigorous inspection and maintenance program be instituted by the community. For the most part such a program would be carried out by the local board of health, except for some communities belonging to a regional health district. A brief description of possible programs and related issues is set out below and should be referred to when a public education program or inspection and maintenance program is recommended for a community.

A public education program to inform homeowners of proper septic tank maintenance procedures should include, at a minimum, the following guidelines:

1) Pump the septic tank regularly, at least every two years, more often in some areas or if indicated by periodic inspection.

2) Minimize water uses in the home. Excess water will decrease the effectiveness of the septic tank and lead to flooding of the leaching area. Never empty basement sumps or other sources of clear water into the system. Run dishwashers and washing machines only with full loads. Fix leaky faucets and toilets promptly.

3) Avoid disposal of the following substances in the system:

   - Coarse Organic Matter - vegetable trimmings, ground garbage, sanitary napkins and coffee grounds will clog the septic tank with sludge and require frequent septic tank pumping.

   - Fats and Grease - Automotive oil should never be put into the septic system. Cooking oil and bacon grease, etc. may pass through the septic tank and clog the leaching area causing the system to back up.

   - Chemicals - Pesticides, disinfectants, acids, medicines, paint, paint thinner, etc., will kill the bacteria which decompose organic matter in the septic tank thereby causing increased sludge accumulation and more frequent pump-outs to keep the system operating properly.

This information can be disseminated to homeowners through a special meeting, or can be included in other community wide mailings such as water bills, tax bills or incorporation into the community's annual report. Another technique is to provide technical assistance to individual property owners. This would take the form of a service offered to individual homeowners rather than, as in the case of the mandatory maintenance program, a legally enforceable regulation applicable to the entire community. Many of the problems that arise in the disposal of wastewater result from the individual homeowner's lack of knowledge of remedial techniques. Technical assistance--problem analysis followed by specific recommendations--would therefore be offered on a case-by-case basis.

Recommendations might include installing water conservation mechanisms, practicing water conservation techniques, reducing high water consumption, reducing use of garbage disposals and suggesting the need for new leaching fields. Through this individualized technical assistance, it might be possible to avoid the adoption of across-the-board requirements that are insufficient in some cases and overly restrictive in others. Instead, the "site-specific" problems would be analyzed for the homeowner and alternatives presented for each case or each parcel of land.

A community could adopt, through board of health regulations, a mandatory septic tank maintenance program requiring registration and periodic inspection and cleaning of private disposal systems under the authority of state enabling statutes authorizing boards of health to adopt reasonable health regulations, regulations to prevent nuisances and specific regulations governing subsurface sewage disposal. If the homeowner does not voluntarily consent to the inspection, a search warrant would have to be obtained. However, the "probable cause" standard for obtaining such a warrant could probably be met by showing the need for periodic inspection of certain facilities, in this case, septic tanks. There would be no need to show cause to believe that substandard conditions dangerous to the public are actually being maintained.

Developing a program requires coordinated private and municipal effort. The three model programs described in this section have one factor in common - benefits of successful local cooperation and implementation accrue directly to those whose money supports the program. Additional funding from the state and federal levels for such progarms is recommended in this plan in order to encourage rapid adoption of local programs by removing the possible negative impacts on property tax rates. The expanded funding can be justified as less costly than sewering alternatives and more consistent with environmental and growth policy goals. The federal Clean Waters Act of 1977 allows the use of 201 construction grant monies for privately owned treatment works serving one or more principal residences or small commercial establishments. However, the public body applying for the grant, generally the community, must meet certain requirements including assurances that such treatment works will be properly operated and maintained and that an acceptable user charge system will be instituted to pay for operation and maintenance costs. An effective inspection and maintenance program might be used to provide these assurances. This plan recommends that EPA, in funding 201 planning which will consider the use of individual or communal on-lot systems and septage disposal and treatment, require the study of mandatory inspection and maintenance programs.

A community can initiate an inspection/maintenance program by utilizing:

1) Municipal Inspection with Publicly-Owned Pumping Service. Costs of staffing and operating a program with full municipal control and equipment ownerships are shown below for a town with 3,000 existing septic systems.

Personnel - Inspection Team and Vehicles	Subtotal	Yearly Total
Chief Inspector: one (1) @ $12,000	$12,000	$12,000
Assistant Inspector: two (2) @ $10,500	21,000	21,000
Clerk-Secretary: one (1) @ $8,000	8,000	8,000
Vehicles - Inspection Team		
Three vehicles in use 200 days/year		
Debt service 6-year vehicle life		2,500
Operating, maintenance, insurance		
15,000 mi. each year @ $0.15/mi.	6,750	6,750
		$50,250

(continued next page)

Septage Pumper Unit

Personnel	Subtotal	Yearly Total
Operator-Driver (1) @ $10,000	$10,000	$10,000
Vehicle		
Pumping Truck $20,000		
Amortization and debt (8% interest) service over five years	6,440**	6,440**
Truck operation, maintenance, insurance 15,000 mi/yr. @ $0.25/mi.	3,750	3,750
		$20,190

** With federal repayment (Sec. 201) of 75 percent of purchase cost at 1/5 balance due per year, subtract 3,750/year...........$16,440

Three full-time inspectors are adequate during start-up, fewer will be necessary once the program overcomes some initial barriers and each inspector completes more than the required two inspections per day. At this minimum rate, each system would be inspected once every 30 months. During the initial phase of the program, about one-half of the systems probably will require cleaning. Since the three inspectors will inspect only 1,200 systems per year to start, about 600 pumping jobs will be likely. Once the program is underway for three years, owners of septic systems will receive the following service and bills:

- costs of inspection will be distributed equally among all owners; costs of pumping will be borne only by those whose systems require pumping;

- inspection - once every 30 months initially - decreasing to every 20 months and costing about $30 per inspection;

- cleaning - once every two to three years at $30 each job or $10-$15 additional per year.

Charges for septic system pumping are separated from inspection costs and billed to owners whose systems require cleaning service. Pumping costs vary inversely with the number of systems pumped each year. The chart below shows costs ranging from $20 each if 1,000 systems are serviced to $50 per cleaning when annual service totals 400 jobs. With federal assistance in purchasing the pumper truck, costs decrease about 20 percent and range from $16 to $41 per job.

SEPTIC TANK PUMPING COSTS

Number of Systems Serviced Annually	Approximate Cost to owner without Federal Assistance	With Federal Assistance
400	$50	$41
600	$34	$27
800	$25	$21
1000	$20	$16

2) Municipal Inspection with Private Pumping Service. By utilizing services of private pumpers a town could avoid getting into the septage hauling business and perhaps take advantage of lower cost per pumping offered by an existing netowrk of large private haulers. Private Massachusetts firms charge from $20 to $75 per pumping with most domestic jobs averaging about $30. Since costs of municipal inspection personnel would remain similar to those in the preceding program, the system owner will realize savings when private haulers can pump at lower costs than town-operated units. Since town-owned pumpers are totally user-supported, municipal cleaning costs may exceed average private fees if less than 600 tanks are pumped annually.

Employing services of private firms cannot absolve local officials of responsibility for ensuring that acceptable methods of disposal are used by haulers involved in a town-supported maintenance program.

3) Private Inspection and Privately-Owned Pumping Equipment. With policy and administrative support by local officials, an inspection and maintenance program could be designed to be run by private firms. Such a program could be implemented by the adoption of a local health regulation requiring owners to apply for a septic tank maintenance permit which application includes a certification from a licensed hauler that the system has been inspected and pumped or not pumped because the volume of sludge and scum was less than 1/3 of the tank volume. Such a permit would be valid for a term of one, two or three years depending upon failure rates in the community and community resources and goals. However, inspection and pumping interests should be separate to avoid compromising the objectivity of inspectors.

Many of the water quality problems from septic systems are the result of poor location and improper installation. In addition to the inspection and maintenance recommendations above, comprehensive water quality management system must establish effective control programs which ensure that systems are installed in a manner and in locations where they will not create water quality problems and which can effectively deal with failing systems. Title 5 of the State Environmental Code is the primary state regulation dealing with subsurface sewage disposal. Recommended changes for Title 5 are set forth in subsequent sections of this plan. Generally, strict compliance with Title 5 will insure adequate location and construction of subsurface sewage disposal systems.

Local boards of health may adopt stricter regulations if they believe such regulations are necessary. The MAPC Water Quality Project does not advocate stricter standards unless local conditions truly warrant them, and in no case should such regulations be used solely to impede otherwise allowable development.

(For additional information on wastewater treatment and on-lot systems, see Part II of this plan. This information includes the description and costs of alternatives which were considered but not recommended.)

II. STORMWATER MANAGEMENT

Recommendations for the control of stormwater runoff and combined sewer overflow pollution were developed based on a three part analysis described in the 208 report entitled "Analysis of Urban Stormwater Runoff and Combined Sewer Overflows in the Boston Metropolitan Area". The analysis included inventorying storm and combined sewer systems, modeling analysis and a wet weather sampling program of sewers, storm and combined outfalls.

Based on this analysis, it was determined that systems of Best Management Practices (BMP's) were the most appropriate control methodology for storm drainage systems. This conclusion is based on the present inability to relate stormwater discharges to in-stream impacts. Until such evaluations are possible (through more data collection), the cost effectiveness of alternative structural control measures cannot be demonstrated. With regard to combined sewers, it was concluded that some type of structural control providing solids removal and disinfection or separation would be required.

Best Management Practices recommended typically include street sweeping, catch basin cleaning, outfall maintenance and inspection and stream channel maintenance programs. With regard to future development, it is recommended areawide that maximum use should be made of natural drainage characteristics and non-structraul runoff control measures. It is recognized that many of the communities for which these recommendations were made are already performing some of these practices. Wherever a community is already performing a recommended practice, the program costs will be lower than those cited. Additional detail on the stormwater runoff and combined sewer program can be found in Part II, Section 4 of this plan. An explanation of the cost estimation methodology is included.

III. DIRECT COSTS

All of the costs presented in this plan are, of course, estimates. A more exact determination of costs can be made only upon examination of the alternative solutions at a more detailed scale which could encompass the geologic and other differences in the communities of the metropolitan area. A 201 study, if recommended for your community, would provide these more accurate estimates. The main value of the cost estimates in this study is to provide one basis for comparison among potential solutions to existing and potential wastewater problems. Part II, Section 2 of this areawide plan presents the estimated costs of the alternative wastewater management solutions which were considered for each community. The methodology for cost estimation is also explained in the same section.

IV. INDUSTRIAL WASTEWATER

The Water Pollution Control Act of 1972, established the National Pollutant Discharge Elimination System. Under this system, all industries (and municipalities) which discharge wastes to the nation's waters are required to obtain a permit to continue discharging. The permits, issued by the state and the U.S. Environmental Protection Agency, set conditions and schedules for eliminating pollution discharges.

An industrial survey and inventory was undertaken by Metcalf & Eddy, consulting engineers under contract to the MAPC. This survey inventoried all industries which:

- discharge wastes to surface and ground water in the 208 study area;
- discharge to municipal wastewater treatment facilities outside the MSD. (This is in recognition of the MDC's on-going survey of industries discharging to the MSD).

Industries identified through the inventory were surveyed to determine their permit status, treatment required, treatment and/or pretreatment provided, the type and amount of waste discharged and also were classified as either significant or non-significant.

For the purposes of this report, industries were classified as significant if they fulfilled one of the following criteria:

- All known discharges to a surface water body;
- All known discharges to a public sewer in the amount greater than 50,000 gallons per day (gpd) or five percent of the total flow at the treatment plant, whichever is less; or
- All known toxic discharges.

Most industries with wastewater discharges to surface water bodies have been issued National Pollutant Discharge Elimination System (NPDES) permits or have NPDES permit applications on file pending issuance. These industries were also classified as significant.

The inventory and classification of the significant industries was not intended to be a fixed list. Many industries are presently constructing pretreatment facilities or planning water conservation programs. These industries may be removed from the significant category following the removal of the toxic wastes, a reduction in flow, or the elimination of discharges to surface waters.

Pretreatment guidelines for the tanning industry and a model sewer use law were also developed under this element. Information collected has been assembled into a formated data base which will be of assistance to communities as well as regional, state and federal agencies involved in the Construction Grants process for determining pretreatment requirements for municipal facilities, developing industrial cost recovery systems and establishing facilities design criteria. A more detailed discussion of the industrial survey is presented in Part II, Section 3 of this plan.

V. NON-POINT SOURCES

For most communities, this section contains recommendations for eliminating two of the most widespread and persistent sources of non-point pollution: (a) pollution from leachate escaping from operating and closed dumps and landfills; and (b) pollution from the storage and application of road de-icing salt. These are not the only major sources of non-point pollution dealt with in this areawide plan. Non-point pollution from septic systems and other forms of on-lot wastewater treatment and disposal are discussed under wastewater treatment to provide for a clearer presentation of the choices involved between structural and non-structural means of wastewater treatment.

A. Landfills

There are over 200 existing and abandoned landfills and dumps in the 208 area. Domestic garbage and trash, industrial chemicals and metals, as well as sludge from septic systems and treatment plants are dumped at these sites and buried. In distinction to the "dump and cover" operations, sanitary landfills are less apt to contribute to water pollution problems since the fill is covered daily and large areas of the fill are sealed once the capacity is reached.

Not all landfills are sanitary, however, and improperly operated and sited landfills are a significant water pollution problem. If fill is not properly protected from rainfall, water will percolate through the refuse and leach out much of the toxic material. The resulting substance - known as leachate - flows to ground and surface water bodies. It is a highly toxic and contains a mixture of organic and inorganic materials as well as living organisms.

According to the results gathered by one researcher one gallon of leachate from a two to six year old landfill contains 400 times the mandatory limit for iron concentration based on federal safe drinking water standards. In other words, one gallon of leachate would contaminate 400 gallons of water with excessive amounts of iron.

Leachate problems are often compounded by improper siting or maintenance of the landfill. In past years landfills were often located in marginal lands - lands that had a low economic value (wetlands or wet soils for example). Drainage in these soils is poor and the refuse often comes in direct contact with the groundwater and thereby pollutes it. Old gravel and sand pits were also frequently chosen as landfill sites because of the ready availability of the cover material. Many of these sandy areas are aquifer recharge areas, however, and as such they are not suitable landfill sites. Water percolates through these recharge areas to replensigh the groundwater reservoir which underlies them; contamination of groundwater is a particularly severe problem in these recharge areas.

Sanitary landfills are sanitary only in that the refuse is buried and is therefore safer from rodents than in an open dump. Yet not all cover material is equally effective in preventing the generation of leachate. If a coarse, sandy cover is used, water will percolate rapidly through the fill and the production of leachate will be maximized, whereas a clay or other impervious cover will be more effective in keeping water from leaching through the refuse.

Unless abandoned landfills are carefully sealed with clay or other impervious materials, leachate generation can continue for many years. One study points out the case of a fill in Germany where leachate pollution from a closed fill lasted for eighteen years.

Water quality planners visited many of the area's landfills, both operating and closed, and consulted other agencies with responsibility in the field. The recommendations vary with the situation, but many call for testing and monitoring to determine the exact nature of a problem and the best means of solving it. The important role of the state DEQE is also recognized in the plan's section on state agency recommendations.

B. Salt Storage and Application

Both improper storage and generous application of de-icing salt on highways have been recently identified as the major cause of rising sodium and chloride levels in public drinking water supplies throughout the state. Public drinking water in many area communities has been degraded primarily by runoff draining from highways during winter and early spring. Salty water moves along stream channels into surface reservoirs, some infiltrates to recharge groundwater aquifers. Rising chloride levels in surface reservoirs parallel rising annual consumption of salt by state (MDPW) and local highway departments. Many public wells tapping aquifers beneath the surface show similar trends. Because water moves far more slowly through an underground aquifer than along a river channel, aquifers do not recover from accidental contamination as quickly as surface reservoirs. Severely polluted groundwater may not be discovered for months or years after contaminants entered the aquifer. Similar time may be required before natural flushing action again reduces the concentration of pollutant to acceptable levels.

The primary component of crystalline road salt is sodium chloride. In water, salt molecules (NaCl) break apart and form separate sodium and chloride ions. The acceptability of water for human ingestion, and many commercial and industrial uses has historically been judged according to chloride ion concentration. The acceptable level varies greatly with the intended use. In drinking water the U.S. Public Health Service (1962) recommended a limit for chloride of 250 mg/l. This limit is an aesthetic standard in which the primary consideration is taste.

Sodium levels have recently taken on greater significance in the assessment of drinking water quality due to the relationship of sodium to numerous human medical problems. Medical authorities advise that patients with congestive heart failure, hypertension or kidney and liver disease should use water containing no more than 20 mg/l sodium. The necessity to restrict sodium intake for such patients is well documented and not in dispute. However, some medical evidence also suggests that a large part of the population, is also affected by similar but undiagnosed health problems, either aggravated or caused by excessive sodium. In 1970, the Commissioner of Public Health notified 63 Massachusetts communities that their drinking water supplies contained sodium in excess of 20 mg/l and that appropriate local interests should be appraised of this fact. At that time no federal or state standard for sodium in drinking water had been defined. In 1977 revised standards for public drinking water will be promulgated for the Commonwealth by the Department of Environmental Quality Engineering. Maximum permissable sodium concentration will probably be set at 20 mg/l with a provision that suppliers of water that cannot meet this requirement notify all consumers in writing that the sodium level is being exceeded. The chloride standard will remain at 250 mg/l.

Intelligent use of road salt first requires careful protection of the storage area from precipitation. In-stream sampling performed by MAPC indicates that severe contamination of streams is inevitable wherever piles of salt or sand-salt mixtures remain uncovered. Open salt piles located on highly permeable soils in aquifer recharge zones pose serious threats to subsurface water quality.

Covering piles with plastic sheet or canvas tarpaulin does not provide reliable protection. Local officials report that canvas tarps are expensive and both types of covers are subject to wind damage, theft, and vandalism. Infiltration of water can be minimized by installing impermeable bituminous pads on which to store salt. Covered wooden storage sheds appear to be the most reliable method of protecting salt piles from runoff caused by precipitation.

It is difficult, if not impossible, to control runoff of salty water after salt has been applied. Although natural dilution aids in reducing the concentrations of sodium and chloride, total reliance on dilution processes for protection of water resources is insufficient. Minimizing stream and aquifer contamination by runoff from salted highways required coordinated effort by local highway departments, public health officials, and environmental groups. Strong, reasonable controls on salt application are necessary at the local level and a basic program is recommended for most communities even though some have already taken steps to control salt use and several have recently improved their salt storage facilities.

The recommendations to the towns apply equally to the state DPW, the MDC and other major salt users. The state's role is discussed further in the recommendations for state agencies.

Several types of non-point sources, other than those studied in this 208 program, were determined by MAPC, DWPC and EPA early in the project (Project Control Plan review) not to be major problems in this area. These other non-point sources include:

- agricultural runoff
- feedlot runoff
- mining activities
- silvaculture activities
- salt water intrusion

(NPS's evaluated in this project include construction activities, septic systems, urban runoff, landfill leachate, and road salt storage and application.)

These determinations were made in accordance with Section 208(b)(2)(F)-(K) which specifically requires the 208 planning agency to identify certain types of non-point sources of pollution and to establish procedures and methods to control such sources. Where the specified activities are not significant in an area, they need not be the subject of 208 planning.

Two other non-point sources found in the MAPC 208 area are hydrographic modifications (dams) and vessel discharges. Sampling programs were developed and carried out to evaluate these problems. (Both sampling programs are included in Part III Appendices.) The vessel discharge sampling in Marblehead Harbor in the summer of 1977 did not indicate a significant problem from that source. The data has been turned over to DWPC for further analysis and comparison with sampling results from other 208 programs in Massachusetts. MAPC sampling results of the hydrographic modifications for sedimentation characterisitcs and benthic organisms were forwarded to DWPC with the recommendation that the Division should in its modeling efforts evaluate the pollutant and hydraulic effects of eliminating dams no longer used for industrial purposes.

VI. PREVENTIVE LAND USE CONTROLS

Understanding the relationships between water quality and land use is essential if we are to avoid repeating past mistakes and to avoid wasting the major investments being made to achieve water quality goals. MAPC 208 planners have presented a series of land use controls for preventing water pollution. For some communities, several recommendations are made; most have one or two recommendations and only a few have none at all.

The range of recommended land development controls includes:

- Natural Resource Districts
  - wetlands districts
  - floodplain districts
  - aquifer recharge districts
  - buffer districts
  - watershed protection districts
  - water resource protection districts
- Use and Density Regulations
- Cluster and Planned Unit Development (PUD)
- Site Plan Reviews
- Subdivision Controls
- Innovative Controls

The use of preventive land use controls is related directly to the choice of solutions for wastewater treatment and both actions should be viewed as elements in a community's overall water quality program even though different boards or local officials are responsible for implementation. This calls for cooperation within local governments, espeically within town government. A town choosing to avoid sewering or to limit the extent of sewering, is unlikely to be successful for long if it continues land use practices which contribute to water quality problems.

As a first step in implementing the recommended land use controls, local officials should consult the maps attached to this plan for an identification of the particular land areas concerned. In most cases a preventive land use control is recommended for a specific area (or areas) within a community and not to the whole community. In some communities, changes have occurred in land use controls since the 208 staff collected and verified its data in 1977. We would appreciate updated information to keep our files and recommendations current.

The scale of the 208 maps with this report is not sufficient detail to permit direct transfer of recommendations into local land use controls. An intermediate step is necessary for most controls, that is, the detailed identification and description of the areas concerned at a level of detail suitable for local regulation. The 208 Environmental Pattern, the De Facto Pattern and all of the 208 land use data is available to assist this effort. The MAPC has several useful model by-laws and ordinances and it is adopting others to reflect water quality protection needs. In addition, technical assistance will be made available to Council communities to assist in the implementation of land use controls and other 208 recommendations. The level of assistance is dependent on the availability of federal funds from EPA.

Another non-structural recommendation, while not a land use control, should be considered by all communities whether they are served by private well water, town water systems or the MDC system. That recommendation is for the initiation of an active program to encourage water conservation. There are several good reasons for such a program including savings in money and energy. But for communities seeking to maintain water quality without sewers, a water conservation program can help prevent septic system failures, reduce the need for corrective maintenance and extend the useful life of septic systems. A sample community water conservation program is presented in Part II of this plan.

To assist local officials in implementing preventive land use controls, the following general guidelines have been drafted. They include:

A. Groundwater - Related Land Use
B. Land Use for Watershed Areas
C. Control of Erosion and Sedimentation
D. Site Plan Review
E. Local Environmental Impact Statements
F. Innovative Land Use Controls

A. General Groundwater - Related Land Use Guidelines

1. Delineate the boundaries of aquifers and their recharge areas within the community.

2. Delineate salt-sensitive areas within the aquifer and recharge areas. Establish and use appropriate snow and ice control procedures. No storage of salt should be permitted with the recharge areas.

3. Establish 50 foot buffers around the waterbodies and courses within the recharge areas with no development permitted, except passive activities which do not disrupt the landscape.

4. Provide road drainage designed to direct runoff to an appropriate discharge site to protect groundwater and surface water supplies. The storm drainage system should be in operating condition in the first stage of construction. Preserve vegetative cover and use basins to meter discharge into the drainage system at rates within the capacity of the system.

5. Maintain minimum pervious area of the site of 85 percent, or in no case less than the average naturally occurring recharge prior to development.

6. Locate new landfills outside of recharge areas and require a site-specific analysis to analyze the effects on groundwater of existing landfills located within recharge areas.

7. Permit the storage of potential groundwater pollutants in the aquifer and recharge areas with a site plan review to determine that appropriate storage facilities are provided.

8. Deep observation hole testing for the siting of septic systems in the recharge or aquifer areas should be permitted only during the periods of high groundwater observations.

9. Establish one of the following zoning and regulatory measures:

a) 1. Zone for the average residential density no greater than two-acre lots when using on-site waste disposal systems.
2. Allow cluster development, through the special permit process, using communal disposal system or individual system in permeable soils, on one-acre sites, while maintaining average two-acre density.

b) 1. Zone for an average residential density between two-acre and one-half acre lots, depending on the particular soil type, where sewer service is provided.
2. Allow cluster development, through the special permit process, while maintaining an average one-half acre density.
3. Permit limited commercial or industrial land uses, where sewer service is provided, with a site plan review to review the amount and design of impervious surfaces and drainage to maintain the maximum possible protection of recharge and groundwater quality.

10. Wherever significant planning considerations suggest higher densities than those indicated above, require the developer to demonstrate by site-specific studies that the proposal, in conjunction with all other zoned uses, will not violate drinking water standards for groundwater.

11. Notwithstanding the minimum measures outlined above, strive to maintain groundwater at the best feasible quality by utilizing more than the minimum measures.

B. General Land Use Guidelines for Watershed Areas

1. Delineate the watershed of waterbodies and water courses within the community.

2. Delineate salt-sensitive areas and minimize road salt use throughout the watershed areas through a salt reduction program, including the elimination or reduction of salt application except on well-travelled stretches and steep slopes and by using salt-sand mixtures, etc. No salt storage should be permitted within the watershed areas.

3. Allow no new landfills within the delineated watershed areas and require a site-specific analysis of existing landfills within watershed areas to determine effects on waterbodies and water courses.

4. Permit no storage of materials which could be potentially degrading to water quality without a site plan review.

5. Require all leaching fields of wastewater disposal systems to be set back at least 100 feet from the bank of the waterbody or water courses.

6. Provide appropriate road drainage designed to minimize runoff and to direct it to an appropriate discharge site to protect the waterbodies and water courses. The storm drainage system should be in operating condition in the first stage of construction. Preserve vegetative cover and use basins to meter discharge into the drainage system at rates within the capacity of the system.

7. Permit no silviculture, animal feed lots, or pastures or confinement areas, or agriculture or drainage from such an activity, except for small household gardens, within 25 feet of the bank of a waterbody or a water course. Elsewhere within the watershed area, silviculture activities, agriculture activities, and animal feed lot, pastures or confinement areas, over five acres should be permitted through a special permit procedure to insure that erosion or runoff may not degrade the water quality of the waterbodies or water courses. Runoff and erosion should be minimized through the use of control techniques including, but not limited to: water retention structures, contour planting and tillage, and terracing.

8. Require a permit for the application or use of fertilizers or pesticides on areas greater than five acres or within 25 feet of the boundary of the watershed or water courses.

9. Permit residential development in a density no higher than that indicated in the following table:

Average Slope of Site (Percent)	Minimum Lot Size (Acre)
3	1/4
4-5	1/2
6-8	1
9-12	2
13-15	4
15	no development permitted

10. Allow commercial and industrial land uses with a site plan review to determine the amount and design of impervious surface, drainage and vegetation to minimize runoff and sedimentation in waterbodies and water courses.

11. Regulate construction within the watershed areas to minimize erosion and runoff by requiring adherence to the practices outlined in "Guidelines for Soil and Water Conservation in Urbanizing Areas of Massachusetts", SCS, April, 1975, to include minimizing the construction period, slope stabilization, ditch maintenance, filtering, sedimentation basins, and vegetation.

12. Wehn planning considerations indicate more intensive development than those indicated above, require the developers to demonstrate by site-specific studies that the proposal, in conjunction with all other zoned uses, will not degrade the waterbodies or water courses.

C. General Guidelines for Control of Erosion and Sedimentation

The general guidelines outlined below could be implemented by a community through several land development regulations. These guidelines could be incorporated in the site plan review requirements of the zoning by-law or ordinance or they could be included in the community's subdivision rules and regulations. It should be noted that if a community chooses to enact these guidelines through the subdivision regulations, then they should be for the purpose of insuring adequate drainage of the locus and protecting on-site water quality. The present scope of the Subdivision Control Law may restrict their use in protecting off-site water quality, and the drainage of adjacent areas outside of the subdivision. A community should consider applying these guidelines to development within a watershed area; highway construction; commercial, industrial, educational, and institutional developments of one area or more; multi-family residential developments of five acres or more; and single-family residential developments of ten acres or more.

1. On-site areas subject to severe erosion and off-site areas especially vulnerable to drainage from erosion and/or sedimentation should be identified and receive special consideration.

2. An erosion and sedimentation control plan should be prepared prior to the approval of any land development requiring a site plan approval or if more than one contiguous acre is to be uncovered-disturbed.

3. The erosion and sedimentation control plan shall be designed to prevent accelerated erosion and sedimentation and should consider all factors which contribute to erosion and sedimentation including, but not limited to:

a) topographic features of the site and adjacent areas
b) types, depth, slope and areal extent of the soils
c) proposed alteration to the site
d) amount of runoff from the site and upstream watershed area
e) sequence of land-disturbing activities
f) temporary control measures for use during construction
g) permanent control measures for long term protection
h) maintenance program for control measures, including disposal of materials removed from control measures or site.

4. All land-disturbing activities should be planned and carried out to minimize the size of the area to be exposed at any one time and to limit exposure to the shortest feasible time, and to minimize off-site sedimentation damage.

5. Surface water runoff originating upgrade of exposed areas should be controlled to reduce erosion and sedimentation loss during the period of exposure.

6. No land-disturbing activity shall be permitted in proximity to a water body or course unless a buffer zone is provided along the bank of the waterbody or course of sufficient width to confine siltation and reduce the velocity of runoff.

7. When the increase in the peak rates and velocity of stormwater runoff resulting from a land-disturbing activity is sufficient to cause accelerated erosion of the receiving stream, plans should include measures to control the velocity and rate of release, so as to minimize accelerated erosion and increased sedimentation of the stream.

8. A combination of adequate retention and detention measures shall be required for highway construction; commercial, industrial, educational and institutional developments of one acre or more; for multi-family residential developments of five acres or more; and for single-family residential developments of ten acres or more. After development of the site, the calculated peak role of stormwater runoff resulting from a ten-year frequency storm should be no greater than that which would result from a ten-year frequency storm on the same site prior to development.

9. Drainage and retention facilities shall, where possible, use natural topography and vegetation. In lieu thereof, there should be planted trees and vegetation, such as shrubs and permanent ground cover, on their borders. All facilities should be maintained by the owner so that they do not become nuisances. Nuisance conditions shall include: improper storage resulting in uncontrolled runoff and overflow; stagnant water with concomitant algae growth, insect breeding, and odors; discarded debris; and safety hazards created by the facility's operation.

10. The angle for graded slopes and fills shall be no greater than the angle which can be retained by vegetative cover or other adequate erosion control measure. Slopes left unexposed will, within 30 working days of completion of any phase of grading, be planted or otherwise provided with grounded cover, devices or structures sufficient to restrain erosion.

11. Upon completion of the development, all disturbed areas shall be stabilized to prevent accelerated erosion.

12. Any temporary control measure during construction shall be maintained until stabilization is complete.

D. General Guidelines for Site Plan Review

1. A site plan review should be required prior to the approval of:

a) any non-subdivision development in floodplain areas, watersheds of waterbodies or courses, aquifer recharge areas, or wetlands; or
b) any non-subdivision commercial or industrial development or multi-family development of ten units or more.

2. An erosion and sedimentation control plan should be submitted as part of the site plan review procedure and should include the information outlined in the "General Guidelines for Control of Erosion and Sedimentation".

3. Data required to be submitted as part of the site plan review procedure should include, but not be limited to the following:

a) soil type(s) and general soil limitations for septic systems
b) soil percolation rate(s) and depth to seasonal high groundwater
c) existing waterbodies, streams and wetlands within specified reasonable distance of site
d) distance from 100-year floodplain and aquifer recharge area
e) existing and proposed contours and grades
f) existing and proposed vegetative cover
g) existing natural drainage, including runoff/infiltration ratio
h) proposed natural and improved drainage system
i) existing municipal water, sewerage and drainage facilities within specified reasonable distance of site
j) proposed provisions for water and sewerage facilities
k) existing and proposed system of roads, including traffic volumes
l) proposed provisions for off-street parking and sidewalks, indicating extent and location of impervious surfaces and effect on infiltration.

4. Measures should be stipulated in the site plan review process which would provide for the following:

- a) stripping of vegetation, regrading or other development shall be done in such a way that will minimize soil erosion
- b) Whenever practical, natural vegetation shall be retained, protected and supplemented
- c) The disturbed area shall be kept to a minimum
- d) Provisions shall be made to accommodate the increased runoff caused by changed soil and surface conditions during and after development
- e) Where necessary, temporary vegetation and/or mulching should be used to protect areas exposed during development
- f) Sediment basins (debris basins, de-silting basins or silt traps) shall be installed and maintained when necessary to remove sediment from runoff waters from land undergoing development
- g) The angle for graded slopes and fills shall be no greater than the angle which can be retained by vegetative cover or other adequate erosion control devices or structures. In any event, slopes left exposed will, within 30 working days of completion of any phase of grading, be planted or otherwise provided with permanent ground cover, devices, or structures sufficient to restrain erosion.
- h) Whenever land-disturbing activity is undertaken on a tract comprising more than one acre, if more than one contiguous acre is uncovered, a ground cover sufficient to restrain erosion must be planted or otherwise provided within 30 working days on that portion of the tract upon which further active construction is not being undertaken.
- i) The development plan or land-disturbing activity shall be fitted to the topography and soils so as to create the least erosion potential.

E. General Guidelines for Local Impact Statements

1. An environmental impact statement, which clearly assesses the relationship of the proposed development to the natural and man-made environment of the community, should be submitted to the planning board for review. The statement should be in sufficient detail to enable the board to determine whether unavoidable impacts have been fully recognized; whether alternatives to the proposed development have been fully explored; and whether all reasonable measures to minimize adverse or unavoidable impacts and maximize beneficial impacts have been taken.

2. An environmental impact statement shall be required by each of the following types of development:

- a) All subdivisions containing more than ten (10) one and/or two-family residential dwelling units
- b) All multi-family residential developments
- c) All non-residential subdivisions

3. The statement for each development shall contain at least the elements required in the following table except as modified by the planning board. The planning board may waive any element, or elements, of the environmental impact statement which it determines is inapplicable to the proposed development. The

developer should discuss the contents with the board prior to the preparation of the statement.

ENVIRONMENTAL IMPACT STATEMENT ELEMENTS
REQUIRED BY TYPE OF SUBDIVISION

Element	RESIDENTIAL SUBDIVISION				Non-Residential Subdivision
	10 20 1 & 2 family	20 or 1 & 2 family	12 multi-family	12 multi-family	
Physical	A), B), C) Required		A),B), C) required		
Public Utility	Required	All	Required	All	All
Transportation		Elements		Elements	Elements
Neighborhood & Community		Are Required	C) & E) Required	Are Required	Are Required
Socio-Economic			B) Required		
Aesthetics			Required		

4. Physical Environment

a) Setting
  1. Describe the physical conditions of the site, including the amounts and varieties of vegetation, general topography, unusual geologic, scenic and historic features, open space areas and wildlife.
  2. Describe the affect of the project on these features.
  3. Describe the relationship of the project to the physical conditions of the surrounding area.

b) Surface Water and Soils
  1. Describe the location, extent and type of existing waterbodies and courses and wetlands and floodplain areas. Describe the existing surface drainage system, both within and adjacent to the site.
  2. Submit an erosion and sedimentation control plan for the construction phase of the development, including but not limited to the following information:
     - approximate extent and location of land to be cleared at any given time and length of time of exposure;
     - use of sediment basins, detention basins, mulching, matting, temporary vegetation, etc. to minimize erosion and sedimentation; covering and storage of material stockpiles.

3. Submit an erosion and sedimentation control plan for the permanent methods used to control erosion and sedimentation, which shall include a description of:
   - areas subject to flooding or ponding;
   - proposed surface drainage system;
   - proposed grading and permanent vegetative cover;
   - methods to be used to protect existing vegetation;
   - relationship of the development to the existing topography;
   - any proposed alterations of shore lines, marshes or seasonal wet areas;
   - any existing or proposed flood control or wetland easements.
4. Where appropriate, the board may require soil surveys to establish the suitability of the land for the proposed storm and sanitary drainage.

c) Subsurface Conditions

1. Describe the procedures and findings of percolation tests conducted on the site.
2. Describe the subsurface soil and water conditions and the impacts of the proposed development on them.
3. Describe any methods used to overcome limitations of existing subsurface soil and water conditions.

d) Air Pollution

Analyze the changes in local air quality resulting from the proposed development, with consideration given to any changes both during construction and after completion of the project.

e) Noise Pollution

Analyze the impact on local noise levels resulting from the proposed development. Consideration should be given to changes occurring both during the construction phase and after completion of the project.

5. Public Utility

a) Water Supply and Distribution

1. Analyze the average daily and peak demand for water from the proposed development.
2. Describe the method proposed to supply the site and buildings with water, including the size of both existing and proposed mains.
3. Analyze the cost of the system and the proposed responsibility for sharing the cost.
4. Describe the methods to overcome any impacts from the development on subsurface water conditions and municipal water supply impoundments and reservations.

b) Sewage Treatment

1. Analyze the average and peak demand and any unusual composition or concentration of component flows into the system.
2. Describe the method of sewage disposal, including the size and location of existing and proposed pipes or tanks.
3. Analyze the cost of the system and the proposed responsibility for sharing the cost.
4. Evaluate the relationship between the sewage disposal methods and surface water, subsurface water, soils, vegetation and topography.

c) Storm Drainage
  1. Analyze the average and peak runoff caused by altered surface conditions.
  2. Describe the methods proposed to serve the stormwater runoff of the site and development, including grading, size and location of pipes, drains, basins, etc.
  3. Analyze the cost of the system and its maintenance and the proposed responsibility for the cost and maintenance.
  4. Describe the impacts of storm drainage on adjacent and downstream surface waterbodies and subsurface groundwater and floodplains, wetlands, and water supply areas.
  5. Describe the methods to overcome the impacts in c)4.

d) Solid Waste
  1. Analyze the average weekly demand for solid waste, the expected contents, and any potential for recycling.
  2. Describe any on-site incineration, reduction, or compaction, and the method of delivery to the community facilities.

6. Transportation

a) Traffic Generation
  1. Analyze the existing traffic volume, composition, peak hour levels and street capacities.
  2. Analyze the average daily traffic generation, composition, peak hour levels, directional flows and parking facilities resulting from the proposed development. The methodology used to derive these predictions shall be included in the statement.

b) Street Maintenance
  1. Describe the methods, responsibility and projected cost to the community of the street maintenance associated with the proposed development.

c) Mass Transit
Describe the relationship between the proposed development and existing mass transit (bus, rail or other modes) and how the development would be served by mass transit and if it would increase the use of mass transit.

7. Neighborhood and Community

a) Schools
  1. Estimate the expected impact on the school system (primary and secondary levels), by type of housing and number of bedrooms.
  2. Describe any significant bus routing changes, if found necessary.
  3. Describe any impacts on private or parochial schools in the community.

b) Police
Describe the impact on police service, including the time and manpower needed to protect the proposed development and any provision for special alarm or warning devices.

c) Fire
  1. Describe the expected fire protection needs, including on-site fire fighting capabilities and on-site alarm devices.

2. Analyze the fire-flow water needs, and the source of the water supply. Describe the delivery system for the development.

d) Recreation and Open Space
   1. Describe on-site recreation provisions; provisions for public open space (either publicly dedicated or available to community residents); and provisions for open space available primarily or exclusively for residents and employees.
   2. Analyze the recreational demands, both on-site and off-site, resulting from the development.

e) Land Use
   1. Describe the compatibility of the proposed development with adjacent or nearby existing land uses and firm development plans for adjacent or nearby land use changes expected to occur during the life of the proposed development.
   2. Describe the compatibility of the proposed development with the established plans of the planning board, conservation commission, public works department, redevelopment authority and other appropriate municipal and state agencies. Where not compatible, the reasons should be described.

8. Socio-Economic

a) Population
   1. In residential developments, the resulting population should be reviewed, including ranges in expected family size, and ranges in expected income.
   2. For non-residential developments, the impact of the development in encouraging additional population growth should be analyzed.

b) Low/Moderate Income Housing
   1. In residential developments, identify the provisions for low or moderate income housing, as to type of housing and number of bedrooms.
   2. Indicate any state or federal subsidies proposed to be applied for the development.

c) Employment
   1. Analyze the number and types of jobs to be employed during the construction of the proposed development. Indicate the amount of local labor intended to be used.
   2. In non-residential projectes analyze the long-term or permanent jobs resulting from the proposed development.

9. Aesthetics

a) Architecture

Describe the style of architecture of the buildings and the compatibility with the function of the building and to the arthcitecture of adjacent buildings. Sketches, photos, elevation, or renderings are encouraged to illustrate the architectural appropriateness, as well as innovation.

b) Lighting

Describe the type, design, location, function and intensity of all exterior lighting facilities. Attention should be given to safety, privacy, security and daytime and nighttime appearance.

c) Landscaping
Describe the provisions for landscaping including the type, location, and function of materials to be used.

d) Visual
Describe the views into the site and from the site. Including long-distance views, as well as to and from adjacent properties.

F. General Guidelines for Innovative Land Use Controls

Several more "innovative" land use controls should also be reviewed by the communities in the 208 area for their possible incorporation into a long-range program of water quality management. Approaches such as performance standards, growth management, and transfer of development rights could play an important role in a community's comprehensive program. A more complete discussion of these techniques is found in Part II, Section 5 of this draft areawide plan, and the Council staff is continuing to develop model regulations and offer technical assistance on their use.

Dissatisfaction with the rigidity of traditional zoning "use districts" and the resultant separation of land uses has fostered increased interest in the concept that land use regulation should be related, not to the land use alone, but rather to the effect of the land use. The idea of regulating uses by their external effect rather than by their name led to the development of performance standards. The use of performance standards means that the offensive characteristics of a particular use will be prohibited from a district, rather than banning the use itself.

If a regulatory approach uses performance standards, the description of a district is usually characterized by a list of uses that are permitted within a particular district, if they meet specific conditions that are more or less scientifically measured. Standards would be included to measure vibration, dust and other particulate matter, odor, toxic and noxious matter, fire and explosive hazards, humidity, heat and glare, radiation hazards, landscaping, enclosed parking, screening; and other criteria such as traffic generation, intensity of the development, or economic impacts would be likely criteria found in a regulation utilizing performance standards.

One example of how a water quality related standard might be utilized in this type of an approach can be seen in regard to drainage and recharge. The regulation would contain standards for the maximum off-lot drainage permitted to take place in conjunction with any development or conversely, a minimum standard for on-lot recharge would be included which must be met by any development proposed for the area so regulated. Those land use activities which could meet the criteria established in this manner would be seen as having no negative effect on the area and therefore would not be excluded.

Traditionally, in the field of local land use regulations, the techniques employed have not generally been directly oriented to the issue of growth. Rather, mechanisms have been used which are directed at the type of development that is occurring within the community. Recently, as communities have experienced periods of rapid growth, traditional regulatory mechanisms have seemed to be inadequate in allowing towns to manage their growth. The demand for services and facilities began to indicate that it was not entirely the type of development creating the difficulties but rather the pace or rate of growth in the town. Often growth was occurring rapidly and creating difficulties, while if this same amount of development had taken place over a longer time span it could have been more easily assimilated by the community. More recently communities have begun to use or consider a type of regulation which does address the issue of growth directly. This type of regulation is concerned with the amount of development which occurs, plus the sequencing or timing of development. As a group, this type of regulation is referred to as a growth management system.

Communities which have attempted to restrict the use of certain natural lands, for example, realize that regulations which prohibit all use of the land are often challenged on the basis that they deprive the owner of his property rights without compensating him for the loss. The technique of transfer of development rights (TDR) attempts to bridge this gap between private property and public regulation. TDR is based on the notion that landownership consists of a bundle of rights which can be separated and sold individually. In other words, an owner of land can separate his right to develop the property from his other rights (e.g., access, agricultural use) and place a value on that right.

While there are many variations of how a system of transfer of development rights could operate, a general system can be sketched here to indicate how a program might operate to protect water quality. The jurisdiction within which the TDR system is to function would prepare a comprehensive plan designating areas within the community to be developed as residential and commercial (development zones) and areas to be kept as open space or rural-agricultural fringe lands (restricted areas). Restricted areas would be water-related lands or critical areas such as wetlands or aquifer recharge areas which, according to the community's comprehensive plan, should be regulated in order to safeguard water quality. Development zones would be areas of the community that were served by municipal services (sewer and water) and which were able to support relatively high densities of development without threatening water quality or other environmental degradation.

VII. MANAGEMENT

The community specific management recommendations are directed toward the implementation of the various functional recommendations (i.e., wastewater, stormwater, landfills, preventive land use controls, etc.). In many instances, most notably in the stormwater sections, the functional recommendations are complete in themselves in terms of identifying agencies and actions, and therefore no corresponding management recommendations appear. The model sewer use ordinance and drain layers manual referred to in the community specific recommendations is presented in Part II, Section 3 of this plan.

It is the intent of the MAPC 208 plan to give to the municipalities, to the greatest extent feasible, the primary, front-line responsibility for implementing the water quality management plan. In terms of designing, constructing, operating and maintaining treatment facilities and controlling the nonpoint sources of pollution identified in the 208 planning effort, municipalities have virtually all the authority that they need. The application of this authority to specific water quality problems is all that is needed in most instances.

The community specific recommendations call for action by a number of different municipal bodies (sewer commissions, planning boards, public works departments, highway departments, boards of health, conservation commissions, etc.). In many instances the recommendations for one board or commission are contingent upon action by another municipal agency. For example, local efforts to limit the need for sewering usually depend upon stepped activity by the board of health in insuring on-site systems are properly operated and maintained. This approach requires intra-community cooperation that, in many communities, has been lacking to date.

Growth policy statements from many MAPC area communities indicate this need for better intra-municipal coordination. The formation of Growth Policy Committees was itself a step in this direction. Communities should consider either the continued existence of this type of committee or the formal establishment of some other coordination procedure. Some communities, such as Milford, have instituted monthly meetings of board and commission chairmen and department heads in order to discuss issues of common concern, and to consider all aspects of long-range community planning. Because of the diversity of water quality-related authority at the local level some type of coordination procedure appears necessary for effective local water quality management. It also offers clear advantages for all aspects of efficient municipal management.

The need for more professional, full-time administration of town government was also expressed as a concern in some growth policy statements. To the extent that wastewater management implications for local government support the argument for more professional staff, communities should consider how this need can be best met. Increased technical assistance from the regional level or a more limited inter-municipal approach to some municipal functions are two alternatives to the hiring of full-time, professional staff by individual communities.

There is a need to key community planning to overall concepts of water quality management. The relationship of communities' natural resources and their protection to the overall sewerage needs of a community is often overlooked in the rush to solve existing problems or apply for federal and state funds. The development of detailed community-wide natural resource information is a goal of this management alternative. By using MAPC 208 information as a starting point, and with technical assistance from MAPC staff, or making use of Soil Conservation Service personnel and programs (such as the Natural Resources Planning Program) communities can build up their own data base for use in all aspects of community planning and development.

The community specific management recommendations also recognize that in many instances an intermunicipal approach to water quality problems and solutions may be more cost-effective. The use of intermunicipal arrangements to provide more cost-effective local services should be fostered whenever appropriate. Intermunicipal sewer service agreements, the establishment of pollution abatement districts or other types of special sewer or septage districts will be particularly important. Regional boards of health could be effective as another intermunicipal arrangement, particularly where stricter control of on-site sewerage disposal systems may preclude the need for costly municipal wastewater treatment facilities. The administration of inspection and maintenance programs may be one area where a regional approach may make fiscal sense. Septage disposal solutions may also encourage the use of regional health districts.

However, for any of these arrangements to be effective they must be linked through contracts, MOU's or through financing mechanisms with the major accountability of general purpose local government.

Other intermunicipal arrangements between local planning boards, boards of appeal, boards of selectmen, and conservation commissions such as the establishment of associated boards on a subregional basis which would foster inter-community cooperation and a greater understanding of the regional impacts of local decision-making are also encouraged. Another option with intermunicipal agreements is for a group of communities to jointly hire on contract with a private operator to perform certain services for the sub-region. The pressure for quality performance at the best possible cost is an advantage in pursuing this approach for certain specific tasks such as septage disposal, solid waste disposal, and water quality monitoring. In addition, this mechanism allows the local government leadership to comfortably join with constituents in advocating upgraded performance from the private contractor.

The MAPC will take a lead role in encouraging, and - if desired - play a brokering role in planning and achieving intermunicipal cooperation and coordination mechanisms. MAPC would also be able to provide technical assistance to groups and communities seeking to establish regional agreements around a specific aspect of service delivery for a specified time. If desired, MAPC could become an actual party to such contracts as in the model of MAPC representing 16 communities with the Army Corps of Engineers on Natural Valley Storage Management for the Upper Charles River. A basic principle of this program is that communities will be able to increase their clout both within the state and the region by forming small, closely-knit alliances around specific issues related to water quality - alliances which last only as long as the issue makes the alliance relevant.

Of course, existing state and regional water quality related institutions (such as MDC, SESD, the Charles River Pollution Control District, and regional boards of health) will also perform important water quality management functions. Recommendations for these management agencies appear after the community recommendations.

While primary emphasis is placed upon municipalities for implementing the water quality management plan, the record of some municipalities to date furnishes little ground for confidence that they will implement effective water quality controls. This plan, therefore, recommends that the state, acting principally through agencies within the Executive Office of Environmental Affairs, play a backstop enforcement role. Recommendations to communities to monitor and control water quality impacts from their landfills, if unheeded, should spark enforcement action from DEQE and possibly DWPC. Failure to adequately control stormwater discharges through the application of best management practices could result in the issuance of a discharge permit by DWPC with a specified implementation time schedule. Failure to adequately protect streambanks and wetland areas could result in a higher priority being assigned to these areas for implementation of state statutes which control such areas. The laws of this state pertaining to the protection of health and water quality already vest in agencies of state government more extensive regulatory powers than have yet been exercised, especially over non-point sources. Political and budgetary constraints have, in the past, inhibited the full implementation of this authority. Documented and flagrant municipal disregard of 208 plan recommendations should weaken these inhibitions.

In terms of recommending management agencies for designation which have sufficient authority under Section 208(c)(2) of the Federal Water Pollution Control Act and state law to carry out assigned portions of a 208 management program, the 92 municipalities in the MAPC 208 area are recommended as general purpose management agencies to carry out those functions assigned in the community-specific recommendations. These functions range from control of land use, stormwater and landfills to the design, construction, operation and maintenance of wastewater treatment facilities. Communities connected to the MSD, SESD, CRPCD or other municipal systems are, of course, only responsible for those activities and controls relating to the transmission of sewage. Part II of this plan contains the necessary information on the legal authority of municipalities to carry out these management activities. Federal, state and regional management agency activities are described in Section 4 of this plan, following the recommendations for local government action.

To assist its member communities to implement the recommendations of the 208 plan, the MAPC will provide technical assistance in a variety of forms. This work will be performed both by the Council's Technical Assistance Unit and by staff expected to be supported by continuing EPA funding for 208 implementation. The recommended 208 technical assistance role with examples of the agency's capacity is presented in Section 4 of this plan and repeated here in part:

"3. The MAPC should provide active technical assistance efforts towards the implementation of 208 recommendations. Assistance to member communities in drafting land use controls and open space plans, and in developing programs and projects for such activities as upgarding landfills and restoring lakes and ponds, planning stormwater management programs, schedules, instituting ordinances for monitoring septic tank maintenance. MAPC with (1) land use skills, (2) legal skills in drafting local by-laws and ordinances, (3) fiscal analysis expertise and (4) considerable experience in direct assistance with local officials, can provide technical assistance in a manner that will achieve community goals and, at the same time, further water quality goals. All MAPC technical assistance projects should be evaluated for consistency with the 208 plan, and whenever possible, geared to the implementation of 208 plan recommendations.

"The MAPC has provided technical assistance to planning boards, conservation commissions and town engineers in: developing programs for defining water quality problems and solutions; writing wetlands orders of conditions; reviewing subdivision plans; and writing wetlands, floodplain, PUD and cluster zoning by-laws in MAPC communities including Lynnfield, Milford, Manchester, Cambridge, Medfield, Revere, Sharon, Scituate, Topsfield, Waltham, Woburn, Dover and Watertown.

"The Council was recently involved in developing management guidelines for the use of 8,500 acres designated as the Natural Valley Storage (NVS) Project area, being acquired by the U.S. Army Corps of Engineers New England Division in the upper two-thirds of the Charles River Watershed. The work began in August, 1977 and was completed in February, 1978. Towns involved included:

> Wrentham, Franklin, Bellingham, Milford, Medway, Holliston, Norfolk, Millis, Medfield, Sherborn, Walpole, Dover, Natick, Hopkinton, Ashland, and Newton.

"The Council has also actively participated in the work of the North River Scenic Rivers Advisory Committee which has proposed regulations and a management plan to the Commissioner of the Department of Environmental Management... These proposed regulations will, if adopted, effectively control pollution from both point and non-point sources in the scenic river corridor.

"As part of its Policy for Land Use in Metropolitan Boston (PLUMB) Implementation Projects for fiscal 78/79, the Council will:

a. prepare alternative design and management schemes for use of the Cambridge Reservoir lands and measure their potential environmental impacts (including water quality). It is possible that the Council's new incentive grants program will be utilized to provide for technical analysis capacities not present on the staff.

b. assist the communities of Stow and Hudson in developing a land use plan for the Lake Boon area which will include actions to maintain and enhance water quality.

c. In addition, the Council has, and will continue, to prepare models, manuals and workshops on land use and water quality related issues. Available models include:

Cluster Zoning
PUD
Building Moratorium
Site Plan Review
Performance Zoning
Phased Growth By-laws
Scheduled Development
Health Board Moratoria
Limits on Sewer Expansion
Local Environmental Impact Data Requirements

(Several of these will be adapted to meet water quality goals under the proposed technical assistance efforts above.)

"A proposal is currently under discussion for MAPC, resources providing, to correlate the secondary impacts of transporation construction on water resources in a given sub-region of the metropolitan area and make specific recommendations to mitigate any negative impacts.

"Subsequent to submission of this 208 plan, MAPC will refine its extensive list of other 208 technical assistance activities into specific communities with priorities of need and opportunity. If at that time we have staff left (i.e., new resources to finance an on-going 208 effort now that the grant is over), we can begin an ambitious program of facilitating plan implementation."

IMPACT ASSESSMENT OF THE WATER QUALITY MANAGEMENT PLAN

The National Environmental Policy Act of 1969 INEPA) was passed by Congress as a comprehensive national policy for protecting, restoring and improving the quality of the human environment. The focus of the act was on the decision-making process of federal departments and agencies, and the act requires such departments and agencies to include an Environmental Impact Statement (EIS) as part of reports or recommendations on actions significantly affecting the quality of the environment. It was thought that if a broad range of environmental parameters and alternatives to the proposed action were examained before a final decision was made, then a better balance between environmental concerns and competing community objectives would emerge.

The preparation of the EIS is the responsibility of the federal agency undertaking or funding a specific action, in this case, the Environmental Protection Agency (EPA). Based on an environmental review undertaken by EPA to decide whether a proposed action may have a significant impact on the environment, a determination is made whether an EIS is necessary. If it is determined that an EIS is necessary, this document describes the alternatives available; the reasoning behind the selection of particular alternative; and the consequences of implementing the chosen action. Before submitting the final statement, the agency is obliged to solicit comments on a draft statement from all federal, state and local agencies having knowledge of any relevant environmental effects or having responsibility for developing and enforcing environmental standards. These comments become part of the final statement submitted to the Council on Environmental Quality (CEQ), the President and the public.

The environmental assessment completed during the development of the areawide water quality management plan includes an evaluation of the social, economic and physical environmental impacts of the recommended plan for achieving federal water quality standards. These impacts were considered in the development of the planning and engineering alternatives reviewed for the areawide management plan. The environmental assessment enables a choice of solutions to be made which are technically and environmentally best and also economically feasible.

A. MAPC Project Approach

In order to carry out the NEPA process, the 208 project analyzed the potential impacts of the preliminary alternatives discussed as water quality solutions throughout the region and has attempted to maximize public discussion of these alternatives. In the preliminary basin reports, a broad range of approaches to water quality management were reviewed for the communities in each basin with one maximizing the use of structural solutions and another one utilizing extensive non-structural approaches for water quality. In addition, another alternative was included which outlines the result of undertaking no more water quality management than is currently underway. This alternative can be an effective measure of comparing the other solutions discussed and is the alternative of taking "no action".

For each of the alternatives included in each preliminary basin report, an evaluation was done of what the potential impacts of that alternative would be. This assessment covered a broad range of potential impacts and included such categories as legal and institutional impacts; water quality and supply impacts; environmental impacts; housing impacts; open space impacts; archaeological and historic impacts; economic/development impacts; governmental impacts; and land use impacts. This impact assessment was presented at the time of the basin report for public discussion and review and was generally included as Appendix D of each basin report. In addition to the complete analysis covered in Appendix D, a summary of the impact assessment of each alternative was included as a chapter in the basin report.

While a complete methodology is available upon request, some brief comments should be mentioned regarding some of the impact assessment discussions which follow.

The assessment of potential groundwater impact involves a review of the "high yield" areas of groundwater favorability and how these coincide with the areas affected by the water quality recommendations. While any development which may occur over these areas could have potential for infiltration affecting the quality of groundwater, the type and density of development indicated will affect the potential for degradation. Certainly high intensity uses would have more possible impact than low-density development, and those uses which are normally associated with extensive site cover would have more possibility of impacts. Also where the recommendations would provide a benefit to the areas of groundwater favorability is discussed.

The procedure used in discussing the several types of environmental impacts involves a comparison of several natural features maps, including slope, flood hazard, wetlands, soils, etc. to those areas affected by the 208 recommendations and also those areas subject to the most significant pressure for development. The magnitude of the positive or negative impacts was based on this overlay technique.

The assessment of the wildlife impacts was done by a comparison of three classifications of areas which could provide habitat for wildlife with the areas affected by the 208 recommendations and the areas subject to the most significant pressure for growth. By using this overlay technique those areas negatively affected by additional development and those positively affected by the recommendations will be outlined.

The discussion of potential housing impacts attempts to outline how the 208 recommendations may affect the cost and diversity of housing within those particular areas affected by the 208 recommendations. Estimating the effects on housing is of course dealing with probabilities and not certainties. While many factors are involved, in determining the supply of housing, one factor of particular importance is the amount of land, required per unit. This housing discussion does not attempt to be an overall assessment of the housing market in the community but focuses on how the recommendations of this study may affect housing in particular areas of the community.

The assessment of archaeological and historic impact focuses on how the 208 recommendations may affect sites identified in the National Register of Historic Places and the Inventory of Historic Assets of the Commonwealth. Also information from the State Archaeologist's Office was used in determining possible impacts. While many historic sites of local interest may not be discussed, this analysis is intended to primarily focus on sites of regional significance. As a community undertakes its 201 study, more detailed analysis of historic and archaeological impacts, including local sites, would be done.

Since water quality maintenance will involve a joint effort of government and water-using manfacturing industries, the assessment of manufacturing is to determine the potential impact on manufacturing employment. (Since the 208 recommendations could have the most potential effect on those manufacturing firms using larger amounts of process water, the discussion concerning manufacturing focuses on the water-intensive segment of manufacturing within the community, based on the water consumption of the firms, and on the overall projected growth or decline of manufacturing in the community.

Several of the issues discussed in the environmental impact statement point out similar issues which are included in the land use planning work of the Council and which are reflected in "PLUMB".* Clearly, the maintenance of water quality and the management of wastewater are closely linked to planning how a region utilizes its land and natural resources. The issue of groundwater protection is certainly one which is of concern to both water quality and land use planning, and in the Council's work in both areas, attention has been directed to the most effective ways to maintain and protect groundwater supplies and minimize uncontrolled sprawl development's effect on groundwater. Also both programs have taken approaches which would tend to concentrate growth and infrastructure, such as sewers, in or contiguous to existing urbanized areas and therefore reflect a coordinated approach to both planning programs. Also the maintenance of water quality can have an effect on the development of housing in the region. A discussion of these potential effects is included in the environmental impact statement, and coordination has been on-going with the housing staff of the Council, so that housing concerns are incorporated.

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* MAPC's "Policies for Land Use for Metropolitan Boston", April, 1978.

Part I, Section 4

RECOMMENDED ACTION FOR FEDERAL, STATE AND REGIONAL AGENCIES

In this section you will find:

General and specific recommendations for action by the:

I. Federal Government

II. State Government

III. Regional Agencies

INTRODUCTION

This section of the MAPC-208 Water Quality Management Plan will set forth recommended actions for management agencies at the federal, state, regional and local levels. It is not intended to be a detailed analysis of existing water quality related management agencies in terms of their legal authority and management and financing structures. That information in contained in Part II sections 1 and 6 of this plan. Set forth below are recommendations for improving the performance of management agencies in achieving water quality goals. A discussion of how management agency actions can be coordinated in a state-wide water quality management system is included in this section. It should be noted, however, that the development of such a system can only be effectively carried out in a partnership between state government, regional planning, and local governments. It is at the state level, where the jurisdiction encompasses all designated and non-designated 208 planning areas, and where effective water quality management regulatory and coordinating authority resides. It is at the regional level where groups of communities can work collaboratively to plan to meet local needs, responsive to local concerns, cognizant of how water quality planning fits with other regional concerns (transportation, housing, etc.), yet able to deal across jurisdictions in cost-effective arrangements. It is at the local level that certain government powers reside to implement and monitor important components of any water quality management plan.

I. FEDERAL GOVERNMENT - General Recommendations

1). Congress, the President and the Administrative Secretariats need to be cognizant of how their water and sewer policy impacts on the Carter Urban Strategy. Specifically: it is detrimental to the environment and the economy of our large metropolitan areas to focus heavily on increased new sewer construction in outlying areas and to ignore the reconstruction and maintenance of facilities now nearly a century old in the urban core areas.

- The local bonding costs are great for small towns and the benefits questionable.

- The local operating and maintenance costs are great for small towns and the return benefits questionable.

- The infrastructure capacity of line commercial and industrial development to suburban and rural areas may be a short sighted hope of shoring up local tax base but in fact may bring hidden costs to small communities, may destroy scarce natural resources and may upset the economic viability of town centers and urban areas already sewered.

- Conversely, failure to upgrade, rehabilitate and maintain century old infrastructure in urban areas contributes to tax costs, urban decay and especially to the deterioration of the urban environment. It does not responsibly by taking initiative to protect (restore previously destroyed) urban environments.

Federal statutes, funding priorities and federal administrative policies must reflect a well thought through policy toward sewer construction, sewer reconstruction and maintenance and septage management alternatives. We cannot afford tunnel vision which sees water/sewer programs apart from land use, urban revitalization, environmental protection and economic stabilization.

2). Congress and the President need to evaluate the legislation and the regulations which mandate large expenditures on secondary treatment. In this era of scarce resources, limited tax dollars and inflation it might be wiser to allocate resources for the investment in water supply (land acquisition, site preparation, dikes, pumping stations, treatment plants and transmission lines. Treatment is obviously important but once again sophisticated and specialized technologies mandated for one aspect of the water resources problem may be tunnel vision and a failure to prioritize public resources.

3). The federal government in all its branches needs flexibility in its regulations sufficient to recognize and encourage the initiatives, the plans and the policies developed at local, metropolitan and state levels. To do other is to not develop the partnership of effort necessary to achieving federal goals and to waste, duplicate and even discourage scarce resources.

4). Congress, the President and the Federal Administrative Agents should immediately take steps to insure planning coordination, investment coordination, and implementation coordination of (a) the water resource program of the federal government, and (b) the wide variety of federal programs which impact collectively on the metropolitan areas of the United States. The vehicles to do this are in place through:

- A-95 structure
- the various metropolitan planning resources.

It is the responsibility of the federal officials to insure that:

- A-95 is taken seriously

- metropolitan planning for all functional issues is coordinated by one organization in one metropolitan area

- planning is not an end in itself geared toward the production of voluminous reports but that federal planning leads to policy votes and subsequently to implementation in a way which coordinates resource investment to result in optimal cost benefit ratios.

This leadership is needed federally if we are really to get maximum implemented results from the water quality, transportation, land use, housing and economic development resources in one metropolitan area.

5). Finally, the agencies within the federal government need to encourage their colleagues to recognize and build a coalition of 3 interest groups: (1) urban interests; (2) conservation interests; and (3) energy interests. The metropolitan area of the nation and each of the three interests will benefit from such a coalition which is achievable because the self-interests are common.

FEDERAL GOVERNMENT - Specific Recommendations

Effective water quality management operates primarily at the state, regional and local level. However, the interplay with various federal agencies and programs is crucial in providing funds and technical assistance, and imposing sanctions for non-compliance with applicable statutes, regulations and standards.

A broad spectrum of Federal agencies were identified during the 208 planning process whose particular areas of expertise and function can be expected to have a continuing role in water quality management. These agencies include:

- Environmental Protection Agency
- Soil Conservation Service - Department of Agriculture
- United States Geologic Survey - Department of the Interior
- Corps of Engineers - U.S. Army
- Department of Housing and Urban Development

A. Environmental Protection Agency (EPA)

The EPA is the principal federal agency involved in water quality management. This involvement stems primarily from its administration of the Federal Water Pollution Control Act. However, it also administers a variety of other environmental statutes which must be considered in water quality management. In terms of its administration of the Federal Water Pollution Control Act six major roles or areas of involvement have been identified as important for areawide water quality management purposes. They are:

- Construction Grants Program-Section 201 of P.L. 92-500.
- Enforcement-NPDES program under Section 402 of P.L. 92-500 includes compliance monitoring.
- Assistance to State and Regional Planning and Management Agencies under Sections 208 and 106 of P.L. 92-500.

- Coordination of Water Quality Management, Water Supply, Air Quality and Solid Waste Programs at State and Regional levels, and with other Federal agencies.

- Technology transfer.

- Research and Demonstration.

Specific recommendations to the EPA in Region I, based largely on their observed involvement and participation in the areas listed above, are as follows:

1). In the administration of the 201 Construction Grants program the EPA should step up its efforts to ensure compliance with all facilities planning requirements including: a full evaluation of non-structural alternatives to sewers; assuring funding eligibility of innovative solutions; assuring that projects are entitled to priority in accordance with the state's priority list and that the funding of a project does not jeopardize the funding of a project with a higher priority; and assuring that projects are consistent with 208 and 303(e) plan recommendations. Many facilities plans reviewed in the MAPC-208 area have not adequately evaluated non-structural alternatives or innovative wastewater disposal solutions. The Clean Water Act of 1977 puts a much greater emphasis on the identification and evaluation of innovative and alternative wastewater treatment processes and techniques and allows the modification of state priority lists to give a higher priority for projects which carry out this identification and evaluation. Every effort should be made to insure that guidelines implementing these aspects of the Clean Water Act of 1977 are fully complied with in the administration of the construction grants program. EPA should take steps to insure that grant recipients are fully informed of the requirements to evaluate non-structural options in their 201 plans. In the past, efforts to expend federal funds prior to appropriation deadlines have resulted in the funding of some projects over those with a higher priority. EPA should closely monitor its construction grants program to insure that this practice does not continue.

2). EPA should take steps to insure that cost-effectiveness guidelines and criteria are applied consistently in all cases. In at least one instance (the Weston, Massachusetts facilities plan) EPA has required the application of cost effectiveness analysis guidelines in such a manner that actual community costs (to discharge sewage to the MDC) are not accurately reflected, thereby altering the determination of the most cost-effective alternative. Moreover, EPA has not required a similar application of the cost effectiveness analysis guidelines in facilities plans for other communities which are currently members of the MSD.

3). EPA should seek assurance from all wastewater treatment management agencies (local and regional) that there is adequate financial capability to support annual operation and maintenance of wastewater treatment facilities. The city of Marlborough has been burdened with unanticipated high operation and maintenance costs and has proposed permit modifications on two occasions since September 1975 in efforts to reduce operational costs. Inability to adequately fund the operation of treatment facilities will likely cause a drop in plant efficiency. Cost estimates for operation and maintenance are required in facilities plans. EPA should assure that existing and potential users of the system are fully aware of these cost impacts.

4). Through the NPDES program, EPA should require compliance with all planning schedules, permit requirements and all applicable effluent limitations. Those dischargers whose effluents have or are likely to have adverse effects on public health should be monitored closely and should be primary enforcement targets. Dischargers whose conduct to date has the earmarks of bad faith should also be enforcement targets. Permit actions should be closely coordinated with construction grant program activity. Enforcement action at the state level has relied to a great extent, and with apparent success, on the use of preliminary injunctions and consent decrees. This allows the enforcement response to vary based on the nature and seriousness of the violation, and preserves cooperative relations with violators, thereby encouraging voluntary compliance.

5). Efforts should be made at the federal, state and regional levels to provide dischargers, particularly industrial discharges, with the technical, financial and economic data necessary to make desisions whether to discharge directly under an NPDES permit or to pretreat, pay industrial cost recovery and user charges, and discharge into a public waste treatment system. With stricter standards, many businesses will either have to change their methods of operation, or install pollution control equipment, or do both in order to conform to the law. EPA should be able to:

- Inform firms of water pollution control requirements, such as pretreatment, industrial cost recovery, user charges, and NPDES effluent limitations;

- Disseminate information on basic technical solutions to pollution problems, including process changes and recycling;

- Direct interested individuals seeking technical assistance to the appropriate individuals or agencies;

- Inform firms of the various tax and financing assistance programs for pollution control;

- Direct interested firms to those individuals in the agencies responsible for certifications and approvals for these programs.

The technical, financial, and economic data could play an important role in both establishing NPDES permit and pretreatment requirements and in enforcing compliance with such requirements. Permits that are based on adequate technical, environmental, legal and economic data will more likely be complied with and if not, will be enforced more effectively. This data could also be utilized in establishing and implementing enforcement priorities and could play an important role if a case comes to trial. Where permit standards are reasonable and a firm was informed of various technical and financial steps it could take to comply but did not take adequate action, a court could determine that such a firm was not acting in good faith. This could be important in determining the amount of a fine or other penalty or relief. Conversely, if a firm was economically marginal and, for example, applied for an SBA loan, this could be taken into account as a mitigatory element.

6). Following the certification of all 303(e) and 208 plans by the Governor and EPA, EPA should, principally through funding, seek to maintain state and regional expertise to ensure periodic update to plans and to foster implementation of plan recommendations. Uncertainty in future funding levels and gaps between grant awards will jeopardize program continuity and waste resources.

7). The Regional Administrator should establish procedures which will ensure adequate coordination of EPA programs within Region I. Of particular importance is the relationship between wastewater treatment and disposal and water supply. A comprehensive water resources program dealing with both water quality and water supply must be developed nationwide. However, internal coordination in EPA regional offices of water supply and water quality programs can be achieved to a greater degree without a comprehensive national policy.

8). Region I should actively seek funds for research and demonstration projects in the New England area. Particular areas of research and development needs are land application, composting, septage treatment and management, combined sewer control alternatives, stormwater BMP's and storage treatment alternatives. The extent to which environmental, economic and social conditions unique to New England prohibit or facilitate the transfer of innovative waste control technologies needs study in the above areas.

9). EPA, under Section 314 of the Clean Water Act is authorized to provide financial assistance to states in the classification of their lakes according to their eutrophic condition. Additionally, grants are available to support the implementation of approved measures to control and restore lake water quality. EPA's initial attitude towards the implementation of section 314 was that the problems of lakes should be first addressed by the other available programs under the Act (201, 402, 404, 208, etc.). As of March 1, 1978 only 66 projects had been approved by EPA, nationwide, at an EPA cost (generally 50 percent of costs) of $19 million. The 1977 amendments continue funding authorizations for these projects at $60 million per fiscal year through fiscal year 1980.

In the past an application for financial assistance could only be made after a specified and detailed course of action to restore the lake had been decided upon. Detailed information on the lake, its drainage basin, the problems involved, the actions proposed, rejected alternative measures, relationship to other programs, an analysis of current baseline data and proposed monitoring programs had to be included in the application. An environmental assessment under NEPA on the impacts on the project was also required. The costs of developing such information were not grant eligible. The limited availability of funds, and the great number of lakes for which assistance may have been sought was said to be the reason why federal grants were limited to 50 percent of the grant eligible costs and why only the restoration projects themselves were eligible for funding.

EPA has recently assembled a working group to develop proposed regulations to administer the Clean Lakes program consistent with the new amendments. These regulations will:

- present a uniform set of requirements to define eligible grant applicants and specify the types of projects that would qualify for assistance under the Clean Lakes program;

- provide grant applicants with explicit information requirements to be included in all applications for consideration under the Clean Lakes program;

- require states to prioritize their lakes for restorative action;

- define the administrative procedures used by the agency to receive and review proposals and prepare funding recommendations;

- define federal funding for restorative and pre-restorative activities.

In the MAPC 208 area four section 314 projects are currently underway (Morses Pond in Wellesley, Lake Cochituate, the Lower Charles Basin, the Lower Mystic Lake). There are, however, a number of lakes and ponds in the MAPC 208 area that have significant water quality problems caused by various point and non-point sources of pollution which could benefit from detailed study and the implementation of restoration projects. Unfortunately for most of these waterbodies, the detailed planning and analysis necessary for a 314 grant application has not been done, and absent fairly reliable sources of federal funding at levels which provide a real incentive, communities are reluctant to undertake these studies. Only when there is a real danger of an important community resource being permanently lost or when state enforcement action on a related environmental problem, such as a polluting landfill, is present is there a sufficient incentive for community action.

It is recommended that EPA, in revising its Clean Lakes program increase the federal share to the full 70 percent authorized in the statute, and adopt a three-step grant program - similar to the existing 201 program - providing funds for the planning, design and implementation of lake restoration projects, including the funding of certain lake management techniques currently ineligible, such as the harvesting of aquatic vegetation.

In the MAPC 208 area the following lakes and ponds are recommended for inclusion in any 314 Lake Study Priority list:

Forge Pond	Rockland-Norwell	North-South
Factory Pond	Rockland-Norwell	North-South
Hager Pond	Marlborough	SuAsCo
Grist Mill Pond	Sudbury	SuAsCo
Carding Mill Pond	Sudbury	SuAsCo
Stearns Mill Pond	Sudbury	SuAsCo
Horn Pond	Woburn	Mystic
Lake Pearl	Wrentham	Charles
Lake Archer	Wrentham	Charles
Lake Winthrop	Holliston	Charles
Boon's Pond	Hudson-Stow	SuAsCo
Lake Williams	Marlborough	SuAsCo
Long Pond	Littleton	SuAsCo
Mirror Lake	Wrentham	Charles
Lake Massapoag	Sharon	Neponset

10). EPA will be approving 201 plans of study which will address the issue of septage disposal and treatment and/or the construction of privately owned treatment works serving one or more principal residences or small commercial establishments with 201 funds. In approving such plans, EPA should require the applicant to thoroughly investigate the costs and benefits of establishing a mandatory inspection and maintenance program for on-site wastewater disposal systems. The benefit of such a progarm in insuring that on-site systems are properly operated and maintained should be considered a rebutable presumption by EPA. That is, the burden of proof would be on the applicant to disprove the benefits of such a program. Only when a community can show that septic tanks are being properly maintained or that the lack of proper maintenance has not impeded the overall effective operation of such systems or degraded water quality should this presumption fall. A public information/voluntary maintenance program which has resulted in a documented higher level of septic tank inspection and maintenance and a concurrent and significant drop in septic tank failures might constitute such a showing. The requirement for adopting a mandatory inspection and maintenance program could be administered by EPA in the same manner which it administers its sewer use ordinance requirement. (EPA requires applicants for a Step 3 grant to submit a current sewer use ordinance or a letter of intent to enact such an ordinance.)

B. Soil Conservation Service - Dept. of Agriculture (SCS)

The SCS is the nation's foremost soil and water conservation agency. SCS has been of invaluable assistance during the preparation of 208 plans and should continue to provide input for continuing water quality planning efforts. In addition to supplying substantial portions of the natural features data base (soils, etc), many of the Best Management Practices for control of the non-point sources such as construction activities, silvaculture, agriculture, stream maintenance and mining have been drawn from SCS guidelines, The National Engineering Handbook and the Engineering Manual for Conservation Practices. It is recommended that:

1). SCS continue in its present manner of providing data support and technical assistance to water quality planning agencies. This natural features information and technical assistance is available to state, regional, and local agencies who request it. The Clean Water Act of 1977 amended section 208 of the FWPCA to authorize the Secretary of Agriculture, acting through the Soil Conservation Service, to enter into contracts with the owners of rural land to institute "best management practices" to control nonpoint source pollution from those lands. This program cannot be used to authorize or finance projects that would otherwise be eligible for assistance under the P.L. 566 Watershed Program. It is unlikely that this program will have much of an impact in the Boston metropolitan area. It is designed for use in areas where large tracts of land used for agriculture or silvaculture are under the control of one owner. The SCS operating in eastern Massachusetts should seek to tailor existing programs to implementing 208 non-point source control requirements. A memorandum of understanding should be worked out between EPA Region I and the Massachusetts State Office of the SCS defining programs with common goals being carried on in Massachusetts, and agreeing to jointly fund the implementation of these programs whenever possible. P.L. 566 watershed protection and flood prevention programs and section 208 implementation activities offer a number of opportunities for joint action. (See below)

2). Renewed emphasis should be placed on both the Natural Resources Planning Program and the Public Law 566 Small Watershed Program in communities and subregional groups of communities particularly for major tributary drainage areas. In the MAPC 208 area, the Soil Conservation Service is seeking to expand its Natural Resources Planning Program activities, focusing on communities in the North and South Rivers Basins (and Hingham in the Weymouth Basin). A number of common goals between this program and 208 water quality planning and implementation have been identified by SCS and MAPC staff. Working cooperatively, MAPC and SCS can assist communities in developing and refining their natural resources data base and analyzing and defining community needs and goals in terms of protecting natural resources including water quality. Assistance in implementing open space plans and land use related technical assistance can also be tied into this program. The implementation of land use control measures at the local level to prevent adverse water quality impacts (see community specific recommendations) can be most effective if based upon this type of detailed community analysis. By combining funding from two federal agencies (SCS and EPA), along with technical assistance from federal and regional agencies (SCS and MAPC) and with the added incentive of state administered open space acquisition funds, this program could offer the intergovernmental coordination and technical assistance for managing non-point sources of pollution in urban and suburban areas that has, to date, been lacking.

C. United States Geologic Survey - Dept. of the Interior (USGS)

The USGS is the nation's major water resources agency. The Geological Survey monitors streamflow and fluctuations in groundwater elevations at several hundred stations in Massachusetts alone. The critical need to have accurate measurements of water quantity and availability concomitant with water quality measurements dictates that a strong functional relationship be established between the USGS and EPA. To date, however, there is little evidence of any coordination between these two agencies. Further justification for both agencies to develop close working relations is the fact that USGS also maintains the most extensive water quality monitoring program concomitant with its flow measurements. USGS's data base is maintained in the WATSTOR computer program. There has been little to no utilization of the USGS data base by other federal agencies, state water quality agencies, or 208 planning agencies. It is recommended that:

1). USGS and EPA formalize working arrangements to share their data bases (stored in WATSTOR and STORET respectively) and to make the information contained therein available for use by state, regional, and local agencies.

2). USGS should coordinate its partial flow station gaging activities with the Massachusetts Division of Water Pollution Control so that flow data on main streams and key tributaries is collected during the DWPC intensive water quality surveys on the area's river systems.

3). Formal coordination mechanisms and working arrangements should be made between USGS and EPA.

D. Corps of Engineers - U.S. Army

The Army Corps of Engineers, under Section 404 of the FWPCA and Section 10 of the River and Harbors Act of 1899, administers permit programs to protect U.S. waterways from activities deemed contrary to the public interest. Under these programs, the Corps has asserted jurisdiction over wetlands adjacent or contiguous to other navigable waters and any other waters necessary to protect water quality. In Massachusetts this jurisdiction is similar to the jurisdiction asserted by DEQE and local conservation commissions over wetlands and waterways. The program has been criticized for failing to provide adequate guidance in the definition of the geographical boundaries of wetlands under its control, inadequate evaluation of the cumulative impacts of proposed projects, and the use of unauthorized blanket permits.

The Clean Water Act of 1977 amended Section 404 of the FWPCA to allow the Corps to issue general permits on a state, regional, or nationwide basis for certain categories of activities and exempts certain farming, silvaculture, and ranching activities and maintenance activity from the permit requirements. Also, any state wishing to administer its own individual and general permit program may request such designation from the EPA administrator.

1). It is recommended that, in an effort to streamline and simplify permit procedures, Massachusetts request designation to administer its own permit program, consistent with existing state wetlands and waterways permit programs. The Corps, working with DEQE, EPA, and the U.S. Fish and Wildlife Service should assist in developing such a program.

2). The Corps of Engineers should continue to work with EPA, NOAA, the Coast Guard and other state and federal agencies to monitor the impacts of ocean dumping (including treatment plant discharges) in order to provide the data base necessary to adequately evaluate treatment requirements and dumping restrictions. Every effort should be made to minimize adverse effects on water quality and marine productivity in harbor and offshore areas (particularly in the Boston Harbor and North Shore areas).

3). In January of 1978 the EPA and the U.S. Army Corps of Engineers signed an agreement to delegate to the Corps major management functions of EPA municipal sewage treatment construction grant projects. EPA, of course, retains ultimate responsibility for the contruction grants program. The Corps' role is limited to step III, the construction phase, of projects costing about $50 million or more. This national agreement calls for the execution of implementation agreements between EPA regional offices and Corps division offices. It is recommended that the U.S. Army Corps of Engineers New England Division and EPA Region I execute an implementation agreement detailing the construction engineering functions which the Corps will perform on step III projects. Such an agreement should provide for the monitoring of sewer rehabilitation work, validating estimates of work in place, conducting on-site surveillance inspections, certifying draft and final plant operation and maintenance manuals, conducting close out inspections of treatment systems, conducting value engineering reviews, and assuring that grantees enact adequate sewer use ordinances.

4). The Corps is currently carrying out a flood control program for the upper two thirds of the Charles River Watershed which consists of acquiring 17 of the most critical wetland areas in the watershed in order to preserve them in their natural state so that they can effectively store storm waters and thereby provide an effective non-structural flood management mechanism. This non-structural approach should be thoroughly investigated in all future flood control projects in the area.

E. Department of Housing and Urban Development(HUD)

HUD's 701 Comprehensive Planning Assistance Program has provided substantial planning monies in the past 20 years. While the program is not primarily concerned with the environment, it ties into 208 planning in a number of ways. The 701 plans must include a land use element. This element must include studies and procedures necessary for effectively guiding decisions with a significant impact on where growth will or will not take place. In addition, planning activities must include an environmental assessment that indicates the impacts of the proposed plan. The environmental conclusions must be reflected in the land use plan.

The 701 plans must also provide for the coordination of local, areawide and state land use policies, and achieve consistency between the land use plan and capital improvement programs and transportation open space and public utility plans. Additionally, 701 plans must be consistent with completed 208 plans. To a large extent, the development of 701 land use plans rely on completed 208 work. This aids in achieving consistency. It is recommended that:

1). HUD provide assistance, through Comprehensive Planning funds, to local or regional agencies for the implementation of those land use regulations or land management planning that would maintain water quality for 208 recommendations.

2). HUD coordinate its funding of its local Comprehensive Planning funds with EPA's 201 funds to insure consistency between plans and to provide a more comprehensive analysis of community development. Further coordination can be achieved through the allocation of community development block grants. Under the Housing and Community Development Act of 1977, community development block grants may be available to fund some appeals of water quality-related capital improvements within the 208 area. Although treatment works, interceptors and outfalls would not be eligible, other types of projects, including collection systems could be if basin eligibility requirements are met. There are a number of different grant programs within the Act, each with different eligibility criteria including the basic block grant program, the discretionary grant program, the small cities program, and the Urban Development Action Grant (UDAG) program. The new law adds, as a specific block grant objective, the alleviation of physical and economic distress through the stimulation of private investment and community revitalization in areas with population outmigration or a stagnating or declining tax base.

3). Under the Flood Disaster Protection Act, communities with areas designated as subject to serious flood hazards must adopt adequate land use control measures in order to be eligible for federally subsidized flood insurance. After a community has joined the program and HUD issues the final "rate" maps, the community may appeal the boundaries to HUD, but must ultimately join the "regular" program and adopt land use regulations to minimize flooding and protect the 100-year "floodway." Generally, HUD will approve regulation of land use which raises the level of the dwelling above the 100-year flood level or floodproofs the lower floors. HUD should encourage more extensive local floodplain zoning. In most cases communities should adopt procedures to regulate all new development or construction; to assure that new or replacement water supply and/or sewage systems are designed and located to avoid impairment or contamination during flooding; and to prohibit fill or encroachments in a floodway that would increase the water elevation of the 100-year flood more than one foot. Restrictions should also seek to limit flood related erosion.

4). HUD grant and loan programs aimed at the provision of housing and other developments should include a review of 208 recommendations to assure that the proposed development is not a threat to water quality. On the other hand, HUD should be aware that not all local land use regulations claiming a water quality protection purpose are in fact necessary for that purpose. The assumptions, data base, and projections in this 208 plan and the MAPC's 701 Housing and Land Use Elements are consistent. The metropolitan area is capable of meeting its goals for low and moderate income housing within the recommendations in this plan. Each individual community in the 208 planning area can meet its low and moderate income housing goals within the water quality recommendations. Higher densities on some land or clustering and PUD techniques can be used to offset the recommendations for lower density development with septic systems.

II. STATE GOVERNMENT

The effective coordination and integration of state governmental functions is necessary for a viable water quality management system. State agencies currently carry out a number of activities important to water quality management including the regulation of point sources of pollution and many non-point sources such as landfills and septic tanks. State agencies monitor water quality and set water quality standards. They also supervise the construction of treatment facilities and provide funds for such construction, as well as providing funds for land acquisition. The Executive Office of Environmental Affairs and its departments and divisions are responsible for most of the state level water quality management tasks. Other state departments, such as the Department of Public Works, also play critical roles.

STATE GOVERNMENT - General Recommendations

1). The state should continue and escalate the emphasis begun in Growth Policy to coordinate public investments and regulatory activities across functional secretariats so that the directions pursued by transportation and commerce, housing, land use balance, public health, and environment are comparable and balanced in such a way as to provide maximum emphasis in those areas which will most enhance the quality of life for the residents of the state.

2). The state should develop a more clear cut strategy for collaborating with other public agencies whose resources contribute to actual problem solving. The fact is constituencies at every level (local, regional, state, federal, private for profit and private non-profit) expedite problem solving. The fact is that power and resources are divided among all those levels. The fact is that it is a waste of resources for any one level of government to fail to encourage such specific partnerships on specific issues that maximize resource allocation and minimize cost.

3). The environmental agencies need to put equal emphasis and dollars on "restoration" of already destroyed environment that is naturally placed on "preservation" of the environment from further destruction.

4). It should be noted that the structure coordinating environmental agencies in Mass., while not free of problems, sets an example nation-wide for environmental management.

STATE GOVERNMENT - Specific Recommendations

A. The Executive Office of Environmental Affairs

The Secretary of Environmental Affairs controls some 43 different agencies and programs which are assigned among five major departments. The Secretary and her appropriate departments and divisions have the following water quality related powers and duties:

- Develop policies, plans, and programs for carrying out their assigned duties;

- Provide for the management of air, water, and land resources to assure the protection and balanced utilization of such resources within the Commonwealth, realizing that providing safe water to drink and clean air to breathe is a basic mandate;

- Provide for the regulation and management of marine and coastal fisheries and natural resources including those located in the territorial waters, the economic zone waters and the continental shelf, wetland estuaries, shorelines and interior of the Commonwealth;

- Develop statewide policies regarding the acquisition, protection and use of areas of critical environmental concern to the Commonwealth;

- Promote the best usage of land, water, and air to optimize and preserve environmental quality by encouraging and providing for, in cooperation with other appropriate state agencies, planned industrial, commercial, recreational, and community development;

- Provide for the preservation and abatement of water, land, air, noise, and other pollution or environmental degradation;

- Provide for the control of insects, plant diseases, and pests, and regulate the use and disposal of pesticides;

- Develop programs relating to the reclamation or disposal of solid waste material and the operation of sewer and water systems;

- Encourage the restoration and reclamation of degraded or despoiled areas, including harbors and inland and coastal waters;

- Assist other state and regional agencies in developing appropriate programs and policies relating to land use planning and regulation in the commonwealth;

- Monitor the environment to identify changes and to ensure efficient and effective control practices;

- Develop environmental data management capabilities to aid environmental planning and decision-making;

- Encourage, support, and undertake research facilities to produce information relating to the ecological system, pollution preservation and abatement, resource management, and other areas essential to implementing the environmental policies of the commonwealth;

- Advise and assist local governments, private and public institutions, organizations and associations, businesses, industries, and individuals by providing and acting as a clearinghouse for environmental information, data, and other materials;

- Represent and act on behalf of the commonwealth in connection with federal grant programs;

- Advise and assist state agencies, cities and towns, and other units of local government in the preparation of grant or loan applications with respect to any environmental protection or enhancement programs;

- Promulgate rules and regulations necessary to carry out their statutory responsibilities.

The Secretary is also authorized to "conduct comprehensive planning with respect to the functions of the office," and to "coordinate the activities and programs of the departments and divisions within the office...with a view toward improving administrative organization, procedures and practices..." In addition, in order to carry out this coordination and improvement of operations of all the departments, divisions and other administrative units within the office, the Secretary is given the following powers:

- The power and duty to resolve administrative and jurisdictional conflicts between any such agencies or officers;

- The power and duty to implement, upon request of any such agency or officer, programs jointly agreed to by the Secretary and such agency or officer;

- The power and duty to coordinate and improve program activities involving two or more such agencies or officers.

In light of these powers and duties, it is recommended that:

1). The Secretary of Environmental Affairs appoint a coordinating committee with a representative of each of the relevant state departments and divisions under her control, and that representatives from other state agencies (such as DPW, OSP, and DCA) be asked to join this committee. This committee would be charged with reviewing the development of the statewide Water Quality Management Plan and the implementation of that plan and with making recommendations to the Secretary relative to: the resolution of administrative and jurisdictional conflicts resulting from the development or implementation of the statewide water quality management plan; the joint implementation by EOEA agencies of water quality management programs; and measures that should be taken by the Secretary to improve and coordinate statewide water quality management. State management activities as defined in the "Continuing Planning Process for Water Quality Management" would remain essentially the same in terms of duties to incorporate the various elements of the statewide plan. This committee will, however, provide a forum and, hopefully, agree upon policy advice for the resolution of conflicts and actions necessary to hasten implementation by relevant state agencies. (1 person year)

2). Water supply and water resources planning conducted within the Executive Office of Environmental Affairs must be much more carefully integrated into the continuing planning process for statewide water quality management. As recommended in the State Growth Policy Report, a total systems approach must be applied to water resources.

3). The objective of a 208 management program is to rationalize environmental management, to overcome fragmentation of responsibility, eliminate unnecessary duplication and avoid agency conflicts. EPA guidelines state that program supervision and coordination are requisite functions in a 208 management system. Furthermore, the guidelines state a preference that there be one management agency to be ultimately responsible for program supervision and coordination. Several management agencies could perform supervising and coordinative functions, but one agency should be given the lead role.

> "Areawide institutional arrangements must assure that the overall program of waste management and regulation of pollutant sources is coordinated, the plan implemented, and its performance assessed. It is essential that overall supervision of the program and accountability for its operation be achieved through the designation of an agency to possess the authority and resources for program oversight." (Guidelines for Areawide Waste Treatment Management Planning, at 7-1, 7-2)

The lead management agency should have the organizational structure, administrative procedure and communications system to coordinate the various management agencies. The lead management agency must have the authority and capability, directly or through other agencies, to utilize methods or procedures to assure that the plan will be implemented.

It is recommended that the Executive Office of Environmental Affairs function as the lead management agency to the extent that a lead agency is necessary. The Secretary's office is already designated by statute as the "primary agency of the commonwealth for environmental planning" and authorized to "utilize the services and plans of regional planning agencies, conservation districts, conservation commissions and historical commissions in fulfilling its environmental planning responsibilities." In developing the statewide water quality management plan the Secretary, acting through DEQE, the designated state water quality management planning agency, would be utilizing the area-wide plans developed by the designated 208 regional planning agencies pursuant to the state's continuing planning process, as stated in that document:

> "It is anticipated that, upon certification of individual 208 plan elements, the Commissioner of DEQE will direct DEQE line agencies to ensure that their program activities are consistent with the 208 plans (and, thus, the Statewide Water Quality Management Program) and that the Secretary of the Executive Office of Environmental Affairs will request that all other Cabinet Secretaries do the same."

EOEA should use the considerable authority of that office to insure that EOEA line agencies take whatever actions are necessary, consistent with their statutory authority, to implement the statewide water quality management plan.

The Massachusetts Coastal Zone Management Program, developed under the direction of the Executive Office of Environmental Affairs, has after three years of preparation, a federally approved plan which sets out 38 policies for the coastal zone with respect to the marine environment, coastal hazards, the visual environment, recreation, energy, general development and public investment. It also defines specific areas along the coast as:

- Significant Resource Areas
- Special Assistance Development Areas
- Areas for Preservation and Restoration

There is considerable similarity in the goals and planning timeframe of the CZM program and the 208 planning effort. Both programs place a strong emphasis on improving environmental quality. Both programs are concerned with water resources and the quality of coastal waters. Both programs entail extensive planning and implementation efforts, and both programs affect water and land uses and thus affect each other. The CZM program does have a broader mandate in that it is directed not only to foster environmental quality, but also to balance this objective with development needs. Another major difference is that the CZM program is concerned with the coastal areas only while 208 is concerned with all waters both surface and groundwater and fresh and saltwater.

EPA 208 regulations require the consideration of CZM planning in the development of 208 plans, while CZM planning agencies were directed to make provisions for full participation by water quality planning and management agencies. The regulations for CZM development grants state clearly that CZM plans must "be consistent with applicable state or federal water and air pollution control standards in the coastal zone". However, the CZM plan can propose and the state can adopt standards which are stricter than those in the Federal Water Pollution Control Act.

In defining their "Significant Resource Areas", the Mass. Coastal Zone Management Program based this identification on certain natural features, which have also been identified by MAPC Water Quality Project as water quality related lands where protection and proper development is important in maintaining and enhancing water quality. (These areas played an important role in the development of the preventive land use control recommendations in this plan.) Both CZM and the MAPC Water Quality Project took much of their natural features information from the SENE study. Using this common data base, and working towards similar goals, the two programs have been, to date, generally consistent in their recommendations.

In addition, CZM participated selectively in "208" public participation meetings as did MAPC staff in CZM public participation meetings. Staff of both programs have consulted on various occasions and worked together on some common projects such as the North River Scenic River designation process.

One area where there may be some inconsistency is with respect to MAPC recommendations for investigating the feasibility of waiving the secondary treatment requirement for certain treatment plants with ocean outfalls in the area. However, under the provisions of the Clean Water Act of 1977, any applicant requesting such a modification must show:

- there is an applicable water quality standard specific to the pollutant for which the modification is requested;

- such modified requirements will not interfere with the attainment or maintenance of that water quality which assures protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife and allows recreational activities in and on the water;

- the applicant has established a system for monitoring the impact of such discharge on a representive sample of aquatic biota, to the extent practicable;

- such modified requirements will not result in any additional requirements on any other point or non-point source;

- to the extent practicable, the applicant has established a schedule of activities designed to eliminate the entrance of toxic pollutants from non-industrial sources into such treatment works;

- there will be no new or substantially increased discharges from the point source of the pollutant to which the modification applies above that volume of discharge specified in the permit;

- any 201 funds available to the owner of such treatment works Act will be used to achieve the degree of effluent reduction required by Section 201 or the requirements listed above.

The Massachusetts Coastal Zone Management Plan recommends that "applicants proposing construction and operation of ocean outfalls for municipal waste treatment facilities to furnish the following data to provide for adequate assessment of effects on marine productivity or public health.

- definition of the tidal excursion for the proposed outfall location;
- definition of the dilution of the sewage effluent which can be expected as a result of volumes of water passing the outfall under critical conditions;
- calculation of the maximum pollution parameter levels expected at the proposed outfall location, particularly total and fecal coliform bacteria, total nitrogen and total phosphorous, total organics, heavy metals, and toxic substances."

The MAPC 208 project therefore believes that there is no inconsistency with the CZM plan in this recommendation for investigating the feasibility of modifying the secondary treatment requirement for certain ocean outfalls. The data required under the Clean Water Act of 1977 should provide for an adequate assessment of effects on marine productivity and public health as required by the CZM plan.

Finally, the networking concept of the CZM plan, under which the existing authority of the departments and divisions within the Executive Office of Environmental Affairs will be used to implement CZM policies can greatly aid in providing effective water quality management. Most of the controls necessary for effective water quality management reside with the agencies within EOEA (subsurface sewage disposal, landfills, wetlands protection, wetlands restrictions, scenic rivers and all DWPC and MDC [MSD] activities). The CZM plan provides a means for a more coordinated approach to the administration of these responsibilities. The expansion of this networking concept in the development of the state-wide water quality management plan is both logical and necessary.

B. Department of Environmental Quality Engineering (DEQE)

The Department of Environmental Quality Engineering in the Executive Office of Environmental Affairs has extensive, but not always exclusive management responsibilities and authorities in water quality related areas.

In an effort to coordinate the agency's permit granting authorities, the organizational structure of DEQE has been revamped to establish four divisions. Two of these, the Division of Water Pollution Control and the Division of Water Supply, existed under the prior structure. The two other divisions are the Division of Land and Water Use and the Division of Air and Hazardous Materials. The Water Resource Commission and the Hazardous Waste Disposal Board, both within DEQE, have not been affected by this administrative reorganization. DEQE also has a Bureau of Planning and Program Management which serves the Commissioner of DEQE and, in many cases, the Secretary of Environmental Affairs, and among other duties, has been assigned the task of planning for the non-designated 208 areas in Massachusetts.

Because a large percentage of the population of the Boston metropolitan area utilizes on-site sewage disposal systems, it is important to insure that such systems are properly located and constructed, and that they are adequately maintained. DEQE is responsible for the promulgation, and certain aspects of the administration, of Title 5 of the State Environmental Code, the primary state regulation dealing with subsurface sewage disposal. While the existing Title 5 is an improvement over earlier subsurface disposal regulations, some additional changes should be made to make it more responsive to the implementation of final 208 plan recommendations. Recommendations to DEQE in this and other matters follow.

1). DEQE should work together with the DWPC to develop Standard Methods of Practice for the design, construction, operation, and inspection of all wastewater, septage, black water and gray water treatment systems including land application systems, sludge and industrial waste treatment processes and package plants. (10 person years). Guidance on acceptable treatment processes and practices would be extremely helpful to many communities attempting to plan for future septage treatment and management.

2). The prohibition against the communal use of subsurface sewage disposal systems should be relaxed to clearly allow the multiple use of subsurface sewage disposal systems in some circumstances such as: when existing systems pose a threat to public health, safety, or water supply and the communal system is the most cost-effective sewage disposal alternative; when the communal systems are publicly-owned (a publicly-owned communal system is presumably allowed under exisiting statutes as a publicly-owned wastewater treatment facility); or when the rights and responsibilities of the users of the system for its operation, maintenance and repair are clearly established including the right to inspect the system, the obligation to pay a proportional share of the cost of construction, operation, repair and maintenance of the system, and the obligation to use the system in a manner which would not damage the system. While a variance can be granted presently to the prohibition on communal systems, the present policy strongly discourages the consideration of such systems in planning for future municipal wastewater disposal solutions.

3). DEQE should resume jurisdiction over permitting subsurface disposal systems between 2,000 and 15,000 gal. per day. DEQE's withdrawal from this area has meant that most restaurants, apartment buildings, schools, beauty salons, gas stations, etc., must be permitted only by local boards. Since many of these facilities present complex waste disposal problems not found in residential systems, local boards of health need more expertise and time to deal with the technical and administrative aspects of regulating these facilities. Of course, the extent of this impact varies depending upon the types of growth or development pressures facing individual communities. DEQE estimates an annual cost to perform this responsibility of $250,000 to $300,000 a year.

4). An alternative to the full resumption of this activity at the state level would be state delegation of the responsibility for systems between 2,000 and 15,000 gal. per day to local boards of health who: have employed as a health officer, an engineer, or registered sanitarian experienced in subsurface sewage disposal, or have as a requirement of their local health ordinance that a registered professional engineer or registered sanitarian, with experience in subsurface sewage disposal review all plans and inspect the installation of the system: when the excavation is completed; when the tank, distribution box, and distribution lines are in place and uncovered; and when the final grading is completed. The engineer or sanitarian would then certify to the local board that the work was completed in accordance with the terms of the permit, the approved plans and applicable regulations and ordinances.

5). DEQE should amend Title 5 to require that access manholes, not brought to finished grade, be clearly and permanently marked in order to facilitate maintenance.

6). DEQE should amend Title 5 to prohibit groundwater determinations, through the digging of deep observation holes, at a minimum, during the months of June through October. Groundwater elevation during the year can fluctuate as much as ten feet. Highest groundwater elevations usually occur during the months of March, April, and May. While it is possible to determine the highest groundwater elevation by the mottling of the soil in the deep observation hole, such a determination requires an experienced soil scientist. There is considerable controversy over what the impact would be on development to allow groundwater elevation tests to be conducted only during three months of the year. DEQE should seek to define a compromise position which is acceptable to development, environmental and public health interests. The present provision is too broad to insure accurate groundwater elevation determinations, and, given its obvious inadequacy, prompts the adoption of stricter local standards which lack uniformity, and may be overly restrictive.

7). DEQE should amend Title 5 to require deep observation holes and percolation tests in reserve leaching areas. This is the only realistic way to insure that the reserve area is sufficient to replace the capacity of the original leaching area.

8). DEQE should sponsor workshops and disseminate technical material for local board of health members and staff on subsurface sewage disposal issues, including septage disposal and treatment. This activity would not only improve local performance in the administration of Title 5, but would also encourage uniformity in local procedural and design requirements. (.5 person years)

9). Judicial interpretations of the state's subdivision Control Law and the authority of local boards of health have indicated that, in the subdivision approval process, planning boards must defer to boards of health on issues relating to subsurface sewage disposal. The nature and scope of the board of health's review of subdivision plans with respect to subsurface sewage disposal is unclear. Neither the Subdivision Control Law nor Title 5 set any clear standards for review. One court has suggested that the only reasonable action for a board of health to take on a subdivision plan approval is to require the planning board to endorse a condition on the definitive plan to the effect that no dwelling shall be built on any lot without first securing from the board of health the disposal works construction permit. Such an approach is likely to result in the approval of subdivisions with lots unsuitable for subsurface sewage disposal and the unsuspecting lot owner, not the developer, being stuck with a lot that does not meet minimum requirements. While recommendations for amending the Subdivision Control Law are made elsewhere, it is recommended that DEQE amend Title 5 to provide for uniform, fair, and accurate procedures for carrying out tests to determine the suitability of lots for on-lot sewage disposal in the context of the subdivision approval process. The use of soil surveys, groundwater determinations, and percolation tests should all be considered. This will eliminate an area of considerable uncertainty, foster intercommunity cooperation and provide for more informed local decision-making. (If necessary, the Subdivision Control Law and Chapter 21A S.13 of the General Laws should be amended to clearly authorize such standard setting.)

10). Under Chapter 85, section 7A of the General Laws DEQE has authority over stored road salt. DEQE can issue regulations as to how road salt may be stored and may "by specific order, in a particular case regulate the place where such chemicals may be used for such purpose." It also requires annual reports by persons using more than one ton of snow removal chemicals as to amounts used, by road section, and the amount of chemicals on hand. No regulations have ever been issued implementing this section, and while requests for an annual report are made to municipalities and major known users of road salt no effort is made to compel the submission of these reports. It is recommended that DEQE fully implement Chapter 85, section 7A. A number of specific deficiencies with current lack of enforcement should be corrected:

- Although the statute requires that all users of snow removal chemicals report annually to DEQE, compliance is far from complete. Many communities fail to respond and those that do often provide incomplete information regarding use, storage, and drainage.

- There is presently no money nor staff at the state level to implement the section. Reports once filed, are not verified for accuracy, and potential problems are not investigated or pursued in any way.

- The format of the report is not ideal. Modifications could improve the quality and completeness of the data received.

11). Specific requirements concerning the storage and use of salt should be promulgated by DEQE:

- Salt should be stored in sheds on impermeable surfaces, e.g., bituminous concrete pads.

- Adequate drainage in the vicinity of the shed should be assured.

- Salt should not be stored in the immediate vicinity of municipal wells, surface waterbodies, or uncovered, or in aquifer recharge areas. Adequate setbacks from waterbodies and covers should be assured.

- All towns should develop maps of local drainage basins and road networks which drain to salt-sensitive areas; e.g., aquifers, wells, streams tributary to reservoirs and should develop a program of salt use that designates certain sections of roadways to receive: a) sand only, or b) sand/salt mixture. The state DPW should be required to comply with local programs.

It is estimated the recommendations above, with the exception of the development of town maps, would require 1.2 person years of work, initially.

12). DEQE has authority under section 150A of Chapter 111 to regulate the siting, operation and maintenance of solid waste facilities. The local board of health must assign the sites of any facility for disposing refuse. Aggrieved parties may appeal to the DEQE. The assignment may be rescinded by the local board of health or by the DEQE if it is determined that the operation or maintenance of the facility is causing a nuisance or a danger to the public health.

State landfill regulations specify that facilities shall be located only at sites where the potential for air, land, and water pollution is minimal. Wetlands and floodplains are specifically excluded except where there is no alternate site and the effect on flooding and water pollution will not be significant. Public and private water supplies must be protected, and refuse must be placed no less than four feet above groundwater and 60 feet from surface water. Plan submissions to the DEQE must include detailed hydrogeologic investigations to assess groundwater conditions and on-site soil suitability for cover material.

While these siting regulations prohibit the selection of bad locations, they fall short of ensuring the selection of excellent sites which offer little or no potential threat to water quality and exceptional leachate attenuation characteristics. The following provisions should be included in state landfill regulations:

a) New landfills should be excluded from sandy areas having rapid soil percolation rates. However, the total exclusion of permeable sites from consideration in landfill location may preclude landfilling in certain towns due to the prevalence of permeable strata. In the absence of alternative sites, landfills on permeable material should be designed and constructed with systems to control leachate generation or migration or both. In the vicinity of an aquifer, groundwater monitoring should be conducted as a measure to ensure that leachate control systems are operating as planned. Control systems could include combinations of impermeable liners beneath and above the fill, leachate collection drains beneath the fill, or pumping and treatment of surface and groundwater. While these techniques may be effective, they substantially add to operating costs. Also, should a preventive system fail, a permeable soil site will offer little protection to surface and groundwaters, as coarse sand and gravel deposits provide little filtration of leachate constituents. In the absence of leachate collection systems, the minimum distance to groundwater in permeable soil should be increased. In new or existing sites, greater distances to groundwater may be achieved by installing subsurface drains upgradient to the fill. The drains will intercept the groundwater, resulting in lowered groundwater elevations beneath the fill.

b) The horizontal distance to flowing watercourses should also be increased from 60 feet, in the absence of leachate collection systems, to at least 150 feet in order to allow for leachate attenuation through deposition, oxidation, and dilution.

c) Sites which drain into ponds or lakes should be prohibited unless leachate collection is provided. The quiescent water, slow reaeration, and long detention time characteristics of ponds makes them susceptible to oxygen depletion, eutrophication, sedimentation, and discoloration due to leachate inflow.

13). Prior to the passage of state landfill regulations, community refuse disposal often took place in open dumps with minimal operating costs. Submarginal lands (often wetlands) were used, no engineering plans or geologic surveys were prepared, and covering practices were often primitive. Equipment, labor, and utility expenses were minimal. The costs of such operations were to public health and the environment. Rats, insects, fires, and contaminated drainage were typically associated with these neglected open dumps. Landfills must now comply with DEQE regulations which specify an engineered method of disposal designed to minimize water quality and public health problems. However, many landfills in the MAPC 208 area do not generally meet state operating standards. Abandoned landfills in several communities are not capped and continue to release contaminated water to surface and ground water bodies.

a) A first step in assuring compliance with state landfill operating regulations is an adequate monitoring program to detect surface or groundwater quality degradation due to landfill leachate. Each landfill in the state should be assessed by the DEQE for its likely impact on water resources. Present state inspections are infrequent and inadequate for water quality impact assessment. Site investigations should include collecting all existing information on site geology, soils, and water resources.

b) Site visits should be conducted to determine the leachate generation potential of the site as indicated by its size, depth, age, nature of waste, landfilling procedure and topography of the facility and its surroundings. Sites which do not drain primarily to the subsurface may exhibit visible surface leachate streams.

c) Based upon the inventory of water resources and leachate generation potential, a preliminary site analysis should be conducted if it appears likely that valuable water resources are being contaminated or could be in the future. This analysis should include sampling of the surface water bodies and existing wells located near the site. Any surface leachate should be sampled and site vegetation should be examined for signs of stress. Surface drainage patterns during a rainfall should also be noted.

Landfill monitoring expenses would range from a few hundred dollars to a few thousand dollars per year depending upon the size of the landfill and the potential threat to public health. The assessment would require approximately five man days per site including search of office files and site visits. A team consisting of a geologist, a civil environmental engineer, and a technical assistant would be required to conduct the program within each DEQE district.

d) If, in the process of field investigation, there is an indication (visual or sampled) of leachate contamination of surface waters, and if information about the subsurface geology indicates a valid need for groundwater monitoring, a monitoring requirement can be made a part of an administrative order. Additionally, where such monitoring showed significant water quality problems, the Division of Water Pollution Control's authority to permit non-point sources of pollution, noted in another section of this plan, could be used with a permit issued indicating necessary actions to correct the situation and a compliance schedule for the implementation of these measures. Monitoring requirements, including the installation of a groundwater monitoring system could also be required by such a permit.

Landfills in the following communities should receive priority attention by DEQE in a stepped-up monitoring effort (see community specific recommendations for information on landfill site, nature of problem, etc.):

Braintree
Cohasset
Hingham
Holbrook
Hull
Randolph (private landfill)
Holliston
Medway
Wayland
Ashland
Framingham
Hopkinton
Hudson
Maynard
Stow
Duxbury
Hanover
Marshfield
Woburn
Middleton
Sharon
Quincy
Canton
Milton
Norwood
Reading
Danvers
Lynn
Peabody
Boston
Cambridge
Lexington
Lincoln
Needham
Natick
Weston
Bellingham
Norfolk
Franklin

Additionally, closed landfills in the following communities should be monitored to determine water quality impacts from leachate. Because the emphasis for these former landfill areas will be on determining water quality impacts, rather than compliance with operation and closing requirements, the Division of Water Pollution Control may be better able to determine surface and groundwater impacts and initiate the necessary administrative actions against any non-point sources of pollution (see above). The closed landfills in the following communities should be investigated:

Weymouth
Southborough
Scituate
Medford
Arlington
Wilmington
Stoughton
Saugus
Wellesley
Belmont
Dedham
Waltham
Milford
Millis

14). The implementation of DEQE's computer tracking system for projects requiring DEQE permits or approvals and MEPA review is recommended. This system should provide for more effective coordination of various DEQE permitting activities and assurance that such permits are processed efficiently.

15). The coordination of DEQE's wetland protection program with DEM's wetland restriction program is recommended in order to assure that wetland areas critical to the maintenance of water quality are adequately protected. The MAPC 208 plan can assist in this effort by initially identifying these areas. DEQE's wetlands regulations should be expanded to include substantive regulations for evaluating the relative importance of wetland areas and the impact of development activity on such areas. Current regulations are largely procedural in nature although recently proposed regulations relating to coastal wetlands begin to address substantive wetlands protection issues.

C. Division of Water Pollution Control (DWPC)

The Division of Water Pollution Control is administratively within the Department of Environmental Quality Engineering (DEQE). In addition, DWPC is subject to the authority of the Water Resources Commission which is composed of the Commissioners of Food and Agriculture, Commerce and Development, Metropolitan District Commission, Environmental Management, Environmental Quality Engineering, and Fisheries, Wildlife and Recreation Vehicles, and four persons appointed by the Governor, who represent a major type of water user. In turn DWPC and the Water Resources Commission are bound by the Commonwealth's environmental laws. The DWPC has the broadest authority in the state for water quality management.

The DWPC, as the state agency charged with securing the benefits of the Federal Water Pollution Control Act for the Commonwealth, administers the state construction Grants Priority List pursuant to section 106 of the Federal Water Pollution Control Act. The Clean Water Act of 1977 states that the "determination of the priority to be given each category of projects for construction of publicly owned treatment works within each state shall be made solely by that state..." In addition, the Clean Water Act of 1977 allows the Governor of a non-rural state to request that the EPA administrator set aside up to 4% of the construction grant funds for that state to be available only for alternatives to conventional sewage treatment works for municipalities having a population of three thousand five hundred or less, or for the highly dispersed sections of larger municipalities.

1). Because of the possibility of utilizing innovative and alternative wastewater treatment processes in the MAPC 208 area, pending the investigation of such systems in 201 plans (see community recommendations), it is recommended that the Governor request that 4% of the construction grant funds available to the state be set aside for such alternative systems.

2). It is recommended that DWPC expand the Construction Grants Priority List to include funding of non-structural solutions to water quality problems, innovative treatment technologies, septage treatment facilities, and combined sewer overflow treatment facilities. DWPC should coordinate its development of the priority list with the Office of State Planning in order to accurately reflect state and local growth policies and plans. (.1 person years)

3). The Division should publish a monthly status report on the construction grants program to keep state, regional, federal, and local officials appraised of funding availability and the various stages of other projects. (.1 person years)

4). The Division should work together with DEQE staff to develop Standard Methods of Practice for the design, construction, operation, and inspection of all wastewater, septage, black water and gray water treatment systems including land application systems, sludge and industrial waste treatment processes and package plants. (See DEQE recommended actions.)

5). In addition to the intensive water quality surveys presently done every 3-5 years by the Division, continuing water quality monitoring programs should be developed for each of the area's major river systems. More attention should also be given to major tributaries. (2.5 person years.)

6). The Division should work together with USGS to coordinate sampling and flow data collections to occur at the same time. (See USGS recommended actions.)

7). Compliance monitoring should be done under the direction of the Permits and Enforcement sections of the Division and not the Water Quality section as is presently done. This will enable the water quality section to carry on with other important work (such as stormwater modeling and water quality monitoring), which is now often secondary to compliance monitoring. The permits and enforcement sections would, of course, need additional resources to assume this function. (4 person years)

8). Compliance monitoring should be done concurrent with intensive surveys. This would provide some consistency with the determination of impacts of discharges on receiving water quality, and could therefore assist in defining enforcement priorities. The MAPC Water Quality Project used such an approach in its treatment plant sampling program. The information from such a program would be extremely useful in setting permit requirements and in making enforcement decisions. The G.E. plant in Lynn is one example where such information would be useful. (3 person years)

9). EPA has proposed a General Discharge Permit Program to cover separate storm sewers. It calls for the issuance of a general permit to cover separate storm sewers for each "general permit program area" (GPPA). The boundaries for the GPPA would be set by the regional EPA administrator, and could be designated 208 planning areas, sewer districts, city, county, or state political boundaries, standard metropolitan statistical areas, urbanized areas, or any appropriate divisions which will encompass in one or more areas all separate storm sewers subject to the same general permit conditions. The general permits could contain any condition the regional administrator "may reasonably determine necessary to progress in reducing pollution and meet the goals of the Act." However, no general permit could be issued "for any discharge from a point source in conflict with a plan, or an amendment thereto, approved pursuant to section 208(b) of the Act." For such discharges an individual NPDES permit can be required. If such a program was instituted, the Division could issue joint permits as is currently done for NPDES permits, or even without EPA action, develop its own stormwater permit program. However, before any action can be taken to control stormwater discharges either through structural measures or requiring the use of "best management practices" much more must be known about the water quality impacts of stormwater discharges. A viable stormwater modeling program combined and coordinated with research and demonstration projects (funded by EPA) on stormwater control and the effectiveness of best management practices should be first carried out. Additionally, the Division should make its water quality and stormwater computer modeling capability available for use by state, regional, and local agencies.

10). The Division should continue to fund Research and Demonstration projects for innovative treatment technologies, septage treatment and combined sewer overflow treatment alternatives. The funding for such projects should be coordinated and, where possible, jointly funded with EPA R&D projects. The initiation and progress of such projects should be publicized, perhaps in quarterly reports to interested federal, state, and local agencies, organizations and individuals.

11). The Division should amend their recently proposed Water Quality Standards and designate the North River as a National Resource Water, thereby bringing it under the state's anti-degradation classification. The North River has been proposed as an "Area for Preservation and Restoration" by the state's Coastal Zone Management Program. This classification would be consistent with and complementary to that status. The North River has been designated as a National Landmark under the Department of the Interior's Natural Landmarks Program. In order to be designated for natural landmark status, an area must possess national significance as an example of our natural heritage. One of the standards for determining this significance is the continuing integrity of the resource. Anti-degradation status will help maintain the physical integrity of the North River. In January, 1977, the Commissioner of the state Department of Environmental Management designated the North River as a demonstration project under the Scenic and Recreational Rivers Program. The result of this program will be the recording of a protective order in the Registry of Deeds which will regulate development within the scenic river corridor (300 feet from the natural bank of the river). This protective order, which specifically deals with the control of erosion and sedimentation, the storage of hazardous materials and construction activities which alter the natural vegetation or increase runoff, along with an anti-degradation classification will effectively control both point and non-point sources of pollution along the North River and insure that it is preserved as an important state and national resource.

12). It is recommended that the Division evaluate the feasibility, usefulness and cost of developing a computer-based industrial data base on a state-wide basis using initially the industrial data base generated by the MAPC 208 Industrial Discharge Survey. This data base would be of tremendous assistance to several state agencies (OSP, DCA, Division of Employment Security, DEQE, DWPC) as well as regional and federal agencies. It would also be of assistance to local communities for 201 studies, development of industrial cost recovery systems and for evaluating pretreatment requirements. (1 person year)

D. Department of Environmental Management (DEM)

The Department of Environmental Management in the Executive Office of Environmental Affairs has major responsibility for the management of public resources within the Commonwealth. Included within its wide-ranging jurisdiction is the management of state parks, reservations, forests and beaches and the administration of legislatively-established ocean sanctuaries. Through its wetland restriction program, it seeks to identify in advance of particular development proposals wetland areas meriting preservation, and to adopt "...orders regulating, restricting or prohibiting dredging, filling, removing or otherwise altering or polluting..." fairly large wetland areas.

1). The wetland restriction program possesses the distinct advantage of allowing for comprehensive planning of wetlands protection measures. Under the statutes, the commissioner is free to impose restrictions before gradual cumulative development has, bit by bit, seriously impaired a wetland; such impacts may not be noticeable early enough in the course of case by case review, or may relate to patterns of growth rather than individual projects. It is recommended that DEM gear their restriction program towards identifying and eventually restricting critical wetlands areas, particularly those necessary to the protection of water quality. Coordination mechanisms should be established with DEQE's wetland protection program to insure that these critical wetland areas, are adequately protected from adverse development until restrictions can be put in place.

2). DEM is also concerned, through its Bureau of Solid Waste Disposal, with solid waste facilities management. It is involved in planning for solid waste disposal and in the acquisition and disposition of lands used for solid waste disposal facilities.

The Bureau is also conducting state-wide solid waste planning under the recent Federal Resource Conservation and Recovery Act. The Federal Resource Conservation and Recovery Act, in providing for the regulation of hazardous wastes, financial assistance for solid waste management planning, and funding for research, development and demonstration of new technologies for garbage reduction and disposal and resource recovery, will play a key role in dealing with such water quality problems are hazardous waste disposal, septage and sludge disposal and the development of solid waste disposal facilities which will have minimal water quality impacts.

EPA guidelines call for a joint identification by state and local officials of agencies responsible for the development and implementation of a state solid waste management plan. MAPC has been identified to share in planning functions for both hazardous and non-hazardous waste streams along with the BSWD and the municipalities. It is recommended that MAPC concentrate its effort to foster municipal involvement in the development and implementation of the state solid waste management plan through:

- public participation mechanisms;
- coordination of on-going solid waste planning at the state, regional and local level;
- brokering intermunicipal agreements to encourage maximization of resources within MAPC cities and towns;
- coordinating solid waste planning with interrelated land use, water quality, water supply and growth management planning.

3). The Department of Environmental Management has also recently instituted its Scenic and Recreational Rivers Program, aimed at finally implementing the state's Scenic Rivers Act. As noted above, the North River has been selected for the first demonstration project. In administering this program, DEM should:

- Seek to insure the amendment of Chapter 840 of the Acts of 1971 (an Act establishing a system of Scenic and Recreational Rivers and Streams in the Commonwealth) to allow the commissioner to classify rivers and streams according to their natural scenic, cultural and recreation qualities. In addition, the commissioner should be authorized to establish a river or stream commission to administer the provisions of the scenic rivers order for the particular river or stream.
- Seek to insure the creation, by special act, of the North River Scenic River Commission in order to administer the program currently being developed by DEM, working with advisory committees of citizens and public officials from the North River Watershed. (The MAPC Water Quality Project has fully participated in this program with a representative of the MAPC Water Quality Project on the Executive and Regulations Committees.)
- Seek to implement the amended Scenic Rivers statute along other rivers and streams in the MAPC 208 area. Citizens, organizations and public officials in the Ipswich and Back River watersheds have expressed serious interest in such a designation. Sections of the

Sudbury and Charles Rivers have also been recommended for such treatment. While budget constraints and political considerations may limit the extensive implementation of this program in the metropolitan area, it is recommended that these four rivers be given priority consideration. (1 person year)

E. Department of Public Works (DPW)

The DPW is the state's largest highway construction and operations agency. Virtually all DPW activities affect water quality including highway construction, activities, maintenance, drainage and snow and ice control programs. The DPW is also authorized to grant permits for "curb cuts " into state highways for private driveways as well as municipal roads. Developments such as industrial parks, shopping centers and residential complexes often require curb cuts. Curb cuts can be a potentially useful tool for discouraging such developments in unsewered or wetland areas, or other water quality related land areas (aquifers, steep slopes, watershed areas, etc.) Recommendations to DPW include the following:

1). DPW should require the filing of construction activities plans identifying all environmental protection measures, both temporary and permanent, for review prior to the initiation of construction activities. Presently, while environmental impact reports may be required under MEPA such reports generally are limited to the identification of environmental impacts, and do not describe measures to eliminate or minimize such impacts, nor do they allow for public review of proposed environmental protection measures. Eventually standard operating procedures in this area could be set forth for contractors saving case by case time.

2). Highway drainage systems should be designed to direct runoff to an appropriate discharge site to protect surface water supply reservoirs and other critical and fragile environmental areas. The following basic conservation principles should be adhered to:

- Use temporary vegetation and mulching to protect areas exposed during development.

- To the greatest extent possible preserve vegetative cover and use ponds for temporary storage of runoff to meter discharge into the natural or constructed drainage system at rates within the capacity of the system.

- Use conservation practices designed to convey and control runoff safely.

- Construct the storm drain system in operating condition in the first stage of construction.

3). DPW should continue to work with municipal public works departments and water departments to identify salt sensitive areas and develop snow and ice control procedures accordingly. They should be commended for the work in this area in recent months. Such a program should focus on the following:

- Development of maps showing local drainage basins and road networks with locations of salt-sensitive targets (aquifers, wells, streams tributary to reservoirs), as required above.

- Development of a selective application program from such maps that designates specific parts of the road network as no-salt or minimum salt zones, as required above.

- Identification and site-review of snow-dumping areas.

- Education of local citizens about their responsibility during winter or special driving conditions. (2 person years at DPW level)

4). DPW should continue its salt use education program with local municipalities. This program is aimed at training highway crews in salt application techniques designed to minimize excessive salt use, and to identify acceptable snow-dumping areas. (1 person year)

5). DPW should continue to assist local municipalities in providing proper salt storage areas for local salt supplies. A recent act of the legislature provided funds for the construction of salt storage facilities. A sum "not to exceed one million dollars" is available to cities and towns for the construction of salt storage sheds. These funds are administered by the Department of Public Works. While this is a step forward, there is a greater need for the construction of proper salt storage facilities than can be met by this appropriation. DPW should seek funds to continue this construction program in communities where salt storage constitutes a threat to water quality.

6). DPW should continue to review its own salt storage practices and to monitor and evaluate storage sites. Road salt should be stored in covered sheds with impervious floors if contamination is found beyond the storage sites.

F. Metropolitan District Commission (MDC)

The Metropolitan District Commission is a department within the Executive Office of Environmental Affairs. The MDC is involved in the administration of sewerage, water supply, parks, police and roadways within the metropolitan area. The Metropolitan District Commission currently has an aggregate community membership of 54, with the Metropolitan Sewerage District currently having 43 member communities. The MDC is headed by a Commissioner and four Associate Commissioners.

In 1976 the MDC, in conjunction with the U.S. Army Corps of Engineering, published the EMMA Study (Wastewater Engineering and Management Plan for Boston Harbor - Eastern Massachusetts Metropolitan Area). This study was intended to provide guidance for the MDC for wastewater management for the next 80 years and to recommend wastewater management improvements and alternatives for the Boston metropolitan area.

By a memorandum of agreement signed between the MDC and the MAPC in December of 1974, the MAPC agreed to incorporate the conclusive recommendations of the EMMA study, unless additional data developed during the 208 study prompted the need for reconsideration and modification of the EMMA recommendations.

An environmental impact statement on the EMMA study is being prepared by EPA. The following recommendations are made for the MDC:

1). Until such time as the environmental impact statement on the EMMA plan is completed by EPA, MDC should continue to implement those elements of the recommended EMMA plan which are not a part of the EPA EIS.

In 1975, the statute governing the operation of the Metropolitan Sewerage District was amended by the legislature. This Act (St. 1975 C.814) gave the MDC greater control over their system, and altered the way costs are apportioned to member communities, generally in order to meet federal grant requirements. Since this statute was enacted, MDC has proposed amended rules and regulations covering the discharge of sewage, drainage, substances or wastes into the MSD system. Once these regulations are enacted all member communities must have in effect a sewer use by-law or ordinance at least as stringent as the MDC rules and regulations, and they must have procedures and adequate resources for monitoring and enforcing compliance with such by-law or ordinance. In addition, the MDC is in the process of developing and implementing user charge and industrial cost recovery systems for the MDC and MSD member communities which meet federal and state requirements. In light of these programs, and requirements, it is recommended that:

2). The MDC should institute a technical assistance program to assist MSD member communities in determining local UC/ICR system requirements, and to provide guidance in the design development and implementation of required systems. Emphasis should, of course, be placed on the development of user charge systems since the enforcement of ICR provisions is suspended pending federal study of the ICR requirements. (1.5 person years)

3). The MDC should provide assistance to member communities in developing a sewer use ordinance as stringent as the MDC regulations and in assuring that member communities have adequate procedures and resources to insure compliance with such an ordinance. MAPC with its on-going technical assistance program,, its legal assistance to communities and its 208 expertise could undertake this activity for MDC on a contractual basis. Ordinances should be responsive to the individual characteristics of the community. They should be prepared by an ordinance development committee, including individuals with expertise in the fields of environmental engineering, law, management, planning and health and including, at a minimum, representatives of the local government, the MDC, industry and other interested groups and individuals. The MDC should take an active role in organizing such committees, assembling the relevant technical information needed by the committee, and explaining technical and legal requirements to such committees. (1.5 person years)

4). A high priority should be established for the control and treatment of all MDC owned and/or controlled combined sewer overflows. MDC should also assist member communities with combined sewers not owned or controlled by MDC to correct these problems as well.

5). A moratorium on all sewer construction in the Metropolitan Sewerage District should be imposed until the treatment system facilities plans (currently involved in the EPA EIS) have reached the Step 2 Design stage in the construction grants process.

6). MDC should seek facilities planning funds to perform an evaluation of the technical, local and financial feasibility of providing septage disposal services to both member and non-member communities of the MSD. This study would most likely have to await the completion of the EMMA EIS in order to maintain consistency. Such evaluation should include consideration of the following elements:

a. Technical feasibility of disposing septage in the MDC system.

b. Potential locations and costs associated with construction and operating long-term septage handling facilities which will permit septage disposal into the MDC system.

c. Equitable user charges for communities to dispose of septage into the MDC system.

d. Institutions and legal arrangements that could be made so that these communities could discharge into the MDC.

It is further recommended that the MDC continue to allow short-term septage disposal from non-member communities until viable alternatives defined and paid for by those using service are on line.

7). Under the provisions of Public Law 95-217, it is recommended that the MDC seek a waiver of the secondary treatment requirements for the Deer and Nut Island treatment facilities until such time as EPA can demonstrate the cost-effectiveness of such an expenditure in terms of measurable water quality improvements, enhanced recreational potential and enhancement of the aquatic environmental and marine life.

8). It is recommended that land application and sludge utilization be given full consideration in Step 1 facilities plans for the Middle Charles and Upper Neponset Advanced Wastewater Treatment facilities.

9). The MDC should initiate a monitoring program of the Neponset River similar to those underway in the Mystic and Charles rivers to establish the water quality data base upon which the proposed treatment facility could be designed. (.5 person years)

10). Given the heavy dependance of several communities in the Neponset Basin on groundwater for present and future water supplies, the proposed facilities plan for that facility must examine the impact of the discharge on groundwater during low flow conditions and recommend a program of actions required to guarantee the protection of downstream wells.

III. RECOMMENDED REGIONAL ACTION

There are some 65 existing regional entities in the Boston metropolitan area. A few of these institutions are involved in various aspects of water quality management. Some of these agencies have direct water quality management functions; others provide coordination between water quality management and land use, transportation and economic development. The need for increased regional coordination in dealing with water quality problems is clearly evident. The success of areawide water quality management depends, to a great extent, on the ability of regional agencies to plan, encourage, facilitate or require this coordination. However, the political tradition of the Commonwealth makes it clear that municipal and state government must perform the major 208 management roles. It is unrealistic to expect that regional institutions transcending municipal boundaries will be enabled, in the near future, to assume regulatory or management responsibilities for controlling non-point sources, sewer connections, and other water-related land uses. In addition, the need to focus limited resources on upgrading existing regulatory and management agencies makes it unwise to divert taxpayer attention to creating new duplicative management and regulatory services.

A. Metropolitan Area Planning Council (MAPC)

The MAPC was formed in 1963 as an outgrowth of the cities and towns' need to pool their resources in coping with problems associated with rapid growth, as well as with increasing public demands for improved local and metropolitan services at manageable costs. It is a public 133 member agency created by statute with 3/4 of the power given to its 101 member communities. It also has 21 consumer/minority and 11 implementing agency members. It developes regional plans which once voted serve as the foundation of metropolitan area policy as well as maintaining the eligibility of cities and towns seeking federal funds. At present it has developed, adopted and is working toward implementation of a metropolitan land use policy (PLUMB), a metropolitan housing strategy, a regional open space plan, an economic development area plan (EODP), a regional transportation plan (TIP). It provides technical assistance to communities on an individual sub-regional and regional basis with planning and problem solving that is in the interest of the metropolitan area. It assists groups of communities in undertaking joint projects and activities. It provides a democratic forum for local participation in decisions which affect their common interest in the region's future. It promotes intergovernmental cooperation, and serves as an information clearinghouse for member communities. Recommended actions for the MAPC are as follows:

1). The MAPC should perform the annual review and update of the 208 Areawide Water Quality Management Plan on the basis of new information which has been generated, changing circumstances or in response to local, state or federal comments on the plan where such revisions are consistent with the goals of 208 planning and should continue to insure that 208 policies are maintained in the update of other functional plans/policies for the metropolitan region. The MAPC, as an agency which is independent from other management agencies, is in a unique position to evaluate comments on the 208 plan itself, its consistency with other plans and to evaluate management agencies performance in carrying out plan recommendations, in light of changing circumstances and conflicts with other policy goals. This annual review and update can be closely tied to other types of "watchdog" functions such as third party evaluations of management agencies carrying out more action-oriented functions (regulation, construction, etc.) within the management system. (1 person year)

2). If federal and state water quality planning grants are sufficient to maintain technical water quality staff at the regional level within MAPC, the Council can continue to strengthen its existing data base on the nature, extent and causes of water pollution, and correlate that with other planning data for the region. Considerable information on water quality related land use, stormwater and industrial dischargers which has been generated in the initial 208 planning process will become outdated and useless unless there are sufficient resources to maintain and update this information. In addition, an adequate data base will enable us to monitor the progress and the trouble spots in 208 plan implementation and to flag those when doing a range of A-95 reviews and when presenting periodic updates of the State of the Region report. (1 person year)

3). The MAPC should provide active technical assistance efforts towards the implementation of 208 recommendations. Assistance to member communities in drafting land use controls and open space plans, and in developing programs and projects for such activities as upgrading landfills and restoring lakes and ponds, planning storm water management programs, schedules, instituting ordinances for monitoring septic tank maintenance. MAPC with (1) land use skills, (2) legal skills in drafting local by-laws and ordinances, (3) fiscal analysis expertise and (4) considerable experience in direct assistance with local officials, can provide technical assistance in a manner that will achieve community goals and, at the same time, further water quality goals. All MAPC technical assistance projects should be evaluated for consistency with the 208 plan, and whenever possible, geared to the implementation of 208 plan recommendations.

The MAPC has provided technical assistance to planning boards, conservation commissions and town engineers in: developing programs for defining water quality problems and solutions; writing wetlands orders of conditions; reviewing subdivision plans; and writing wetlands, floodplain, PUD and cluster zoning by-laws in MAPC communities including Lynnfield, Milford, Manchester, Cambridge, Medfield, Revere, Sharon, Scituate, Topsfield, Waltham, Woburn, Dover and Watertown.

The Council was recently involved in developing management guidelines for the use of 8,500 acres designated as the Natural Valley Storage (NVS) project area, being acquired by the U.S. Army Corps of Engineers New England Division in the upper two-thirds of the Charles River Watershed. The work began in August, 1977 and was completed in February, 1978. Towns involved included:

> Wrentham, Franklin, Bellingham, Milford, Medway, Holliston, Norfolk, Millis, Medfield, Sherborn, Walpole, Dover, Natick, Hopkinton, Ashland, and Newton.

The Council has also actively participated in the work of the North River Scenic Rivers Advisory Committee which has proposed regulations and a management plan to the Commissioner of the Department of Environmental Management for implementing Chapter 21, Section 17B of the General Laws which allows the Commissioner, with the approval of the Board of Environmental Management to designate rivers in the Commonwealth as "scenic" rivers and may apply restrictive orders which apply to the river and contiguous land (up to 100 yards from the natural bank). These proposed regulations will, if adopted, effectively control pollution from both point and non-point sources in the scenic river corridor.

As part of its Policy for Land Use in Metropolitan Boston (PLUMB) Implementation Projects for fiscal 78/79, the Council will:

a. prepare alternate design and management schemes for use of the Cambridge Reservoir lands and measure their potential environmental impacts (including water quality). It is possible that the Council's new incentive grants program will be utilized to provide for technical analysis capacities not present on the staff.

b. assist the communities of Stow and Hudson in developing a land use plan for the Lake Boon area which will include actions to maintain and enhance water quality.

c. In addition, the Council has, and will continue, to prepare models, manuals and workshops on land use and water quality related issues. Available models include:

- Cluster Zoning
- PUD
- Building Moratorium
- Site Plan Review
- Performance Zoning
- Phased Growth By-law
- Scheduled Development
- Health Board Moratoria
- Limits on Sewer Expansion
- Local Environmental Impact Data Requirements

(Several of these will be adapted to meet water quality goals under the proposed technical assistance efforts above.)

A proposal is currently under discussion for MAPC, resources providing, to correlate the secondary impacts of transportation construction on water resources in a given sub-region of the metropolitan area and make specific recommendations to mitigate any negative impacts.

Subsequent to submission of this 208 plan, MAPC will refine its extensive list of other 208 technical assistance activities into specific communities with priorities of need and opportunity. If at that time we have staff left (i.e. new resources to finance an on-going 208 effort now that the grant is over), we can begin an ambitious program of facilitating plan implementation.

4). The MAPC should act as an agent in convening and brokering intermunicipal agreements between subregional groupings of communities desiring to act together on specific water quality related issues. Regional septage disposal, the provision of regional public health services, regional resource recovery and regional wastewater management (see community specific recommendations) are some of the areas where the MAPC can act as a mediator, convenor or broker.

5). The MAPC should act as a neutral mediator, when requested by the parties involved, in water quality related disputes between communities and between municipalities and state and federal agencies. Such disputes should be reviewed against 208 plan recommendations. Where changing circumstances, other social objectives, or informational errors are identified as inhibiting 208 plan compliance, the MAPC can work towards the revision of the plan and resolve the dispute. In this manner the MAPC role as mediator would be consistent with, and complimentary to its role in annually reviewing and revising the plan.

6). MAPC can enter into contracts with individual communities and/or groups of municipalities to perform certain related planning work where MAPC's base of information and staff expertise can be an asset to the municipality whose tax dollars pay to develop this base of resources. Examples of the type of work MAPC might do on contract with local communities include certain types of 201 facilities planning elements, including assistance on land use and projected development questions, non-point source evaluations, environmental assessment and management planning elements. It must be noted that MAPC will need to work out on a case by case basis those work elements appropriate and provisions for impartial reviews.

B. South Essex Sewerage District (SESD)

The South Essex Sewerage District, comprising the communities of Beverly, Danvers, Peabody, Salem, Marblehead and Middleton, provides facilities for sewage collection treatment and disposal for its member communities. Local collection systems are owned and controlled by the member communities. While the South Essex Sewerage Board (which controls the system) may make regulations to insure the "proper and reasonable operation of its works", its ability to effectively control its system is somewhat limited due to the limitations of its control over local collection systems and individual discharges. It is recommended that:

1). The SESD ask the legislature to amend its enabling authority to provide for clear and sufficient control of discharges into its system (both municipal and industrial) so that it may require municipal, industrial and other users of its system to comply with applicable provisions of federal or state law respecting: toxic and pretreatment standards; construction, operation and maintenance of pretreatment facilities; monitoring, record-keeping and reporting of discharges to the system; notification of proposed new discharges or substantial changes in discharges to the system; user charges; and industrial cost recoveries. The SESD should be able to issue permits to municipal and industrial dischargers specifying such conditions and schedules as may be necessary to safeguard the efficient operation of the system and to meet federal and state requirements. Penalties for violation of rules and regulations and permit conditions should be substantially increased, and provide for civil as well as criminal penalties. Present limits on such penalties ($20 fine for each day the violation continues) are too low to provide a sufficient incentive for compliance.

C. Charles River Pollution Control District (CRPCD)

The CRPCD is presently composed to the towns of Medway and Franklin. It was formed pursuant to the provisions of the Mass. Clean Waters Act regarding the creation and operation of pollution abatement districts. The CRPCD does not currently have operating facilities but a wastewater treatment plant and interceptor sewers are under construction and are expected to be completed in the spring of 1979. A user charge system for the district is currently being prepared. It is recommended that:

1). The CRPCD investigate the septage handling capabilities of its facilities presently under construction. If there is adequate capacity the district should negotiate with the communities of Bellingham, Holliston, Norfolk and Wrentham for septage disposal. This would assist those communities in solving their substantial septage disposal problems, and would assist the CRPCD in meeting the costs of its system.

D. Regional Boards of Health

There are presently four regional boards of health operating in the MAPC 208 area. These are the Hamilton, Essex, Manchester Regional Health District, the Boxford, Topsfield, Wenham Regional Health District, the Nashoba Associated Boards of Health, and the Needham-Wellesley-Weston Cooperative Boards of Health. With the exception of the Needham-Wellesley-Weston district these regional boards are formed under the authority of Chapter 111, Section 27A of the General Laws (see Part II, section 6 of this plan for a more detailed description of these institutions).

The benefits of a regional health district are that: it facilitates coordination and consistency among neighboring boards of health and provides an administrative framework which is easy to work with in terms of assessing costs to member communities; it provides professional public health services to the communities at the lowest cost possible, utilizing economies of scale; and it facilitates the planning of community health programs. Health districts have not been utilized by many communities in the MAPC 208 area because of a misapprehension that such a district will infringe upon local autonomy. In the presently existing districts, there is no such infringement as the local board of health continues to be the ultimate decision maker. Recommendations for regional boards of health are as follows:

1). The presently existing regional boards of health should institute septic system maintenance programs which, at a minimum, provide information to homeowners on the need for, benefits, and mechanics of septic system maintenance.

2). Existing regional boards of health, particularly those serving the communities of Hamilton, Topsfield and Wenham, should closely coordinate their program planning with the planning for future septage disposal in the area. Any consideration of a regional septage facility should be keyed into the existing health districts program planning and administration (see community specific recommendations).

3). Communities which wish to rely on on-site disposal to meet existing and future municipal wastewater disposal needs should seriously investigate the formation of regional health districts with neigoboring communities with similar goals. Public information programs, inspection and maintenance programs and the consideration of regional septage disposal are all activities which could be carried out more efficiently, and at a lower cost through a regional health district. The following communities should consider this recommendation:

Middleton, North Reading, Lynnfield, Acton, Stow, Lincoln,
Sudbury, Wayland, Southborough, Hopkinton, Holliston, Sherborn,
Dover, Norfolk, Wrentham, Bellingham, Sharon, Foxborough,
Hingham, Hanover, Norwell, Pembroke and Duxbury.

E. Ipswich River Watershed District Commission (IRWDC)

The Ipswich River Watershed District, established by special act of the legislature (Chapter 682 of the Acts of 1966), includes the communities of

Andover, Beverly, Boxford, Burlington, Danvers, Essex, Gloucester, Hamilton, Ipswich, Lynn, Lynnfield, Manchester, Middleton, North Andover, North Reading, Peabody, Reading, Rowley, Salem, Topsfield, Wenham and Wilmington. There is a district advisory board with a representative from each community and each water district within the watershed district, as well as a number of non-voting ex-officio members. The district is under the direction of a commission of five members appointed by the advisory board. It is recommended that:

1). The IRWDC stay closely involved with the study of Ipswich River Resources currently being carried out by Metcalf and Eddy under contract with the Water Resources Commission. This project should identify needed methods of water resource management in the basin in terms of demand, storage and delivery.

2). Subsequent to the completion of this study, the IRWDC should encourage the designation of a basin-wide agent to coordinate the management of water resources in the basin. Consideration should be given to expanding the authority of the IRWDC to effectively perform this function.

3). The IRWDC should develop a program of public information focusing on potential water resource projects including specifics on available state and federal funding, potential water demand, potential use, surrounding land uses and the importance of a comprehensive water resources management program. The MAPC can be of some assistance in supplying information, data and advice in the development of such a program. Funding should be sought from the legislature to carry this out.

Part I, Section 5

PUBLIC PARTICIPATION

In this section you will find:

A summary of the public participation process in the MAPC 208 program and examples of citizen and local government influence on the 208 recommendations. The section includes:

I. Public Participation - Process and Structure

II. Influence of Public Participation on the Areawide Plan

   A. Examples of resolution of initial non-agreement with preliminary basin reports and resolution of differences;

   B. Examples of substantial agreement with preliminary basin reports;

   C. Public review of other 208 publications.

III. The Use of Public Information in the Participation Process.

I. PUBLIC PARTICIPATION - PROCESS AND STRUCTURE

The public participation program for 208, which was outlined in the introduction to this plan, has been structured according to the following sequence of ten steps or stages, each of which has built on and benefitted from that preceding it.

	Stages	Public Events
1.	Public Education, Information Dissemination	Workshops; Watershed Association Activities Community and Basin Meetings Advisory Committees
2.	Consultation and Data Gathering	
3.	Community Response, Input, Verification	
4.	Data Integration and Incorporation into Preliminary Basin Reports	Watershed Association Activities Basin Meetings Town Clarification Mtgs. Advisory Committees
5.	Distribution, Public Review and Comment on Basin Preliminary Reports	
6.	Incorporation Comments and Corrections into Basin Addenda, Public Distribution	Individual Town Meetings Watershed Association Activities Advisory Committees
7.	Formal State and Executive Committee Review of Addenda	

8. Preparation of Review and Comment, Draft Areawide Plan	Hearings Advisory Committees Watershed Association Activities
9. Preparation, Review and Comment Areawide Plan	Hearings Advisory Committees
10. Certification and Submission, Areawide Plan	

The following chart puts these stages of activity into the time frame over which they occurred or are projected to occur:

Stage	Time Frame
1,2,3	Summer 1975 - Summer 1976
4	Fall 1976 - late Spring 1977
5	late Spring 1976 - early Winter 1978
6,7	mid Winter 1978
8	late Winter 1978 - early Spring 1978
9	late Spring 1978
10	Summer/Fall - 1978

Highlights of this public participation process are provided chronologically on the following pages to assist readers involved both early on in this study and those more recently becoming involved to follow that which has occurred over the past two and one half years and to see how contributions of data, preference, concerns, questions, and criticisms have been utilized at each stage.

Public Participation Activities July-December 1975

This time period was utilized for introducing citizens and local officials of the 92 communities involved in MAPC's 208 water quality project to the planning process and to define roles the actors could play throughout the program. Staff emphasis was placed on information gathering and data verification for each of the communities with particular attention paid to problems, plans, environment, regulations and trends.

August 1975 - Chief executive, planning board chairmen, and MAPC representatives were requested to provide specified local ordinances, by-laws, codes and regulations dealing with surface and groundwater and land use. Sixty-two of the ninety-two cities and towns returned the materials requested which formed the basis for the analysis of local controls effecting water quality.

September 1975 - Chairmen of boards of health, health officers, and sanitarians were requested to identify (on maps provided by MAPC) areas of known or suspected pollution from septic systems, sanitary landfills and dumps. Forty responses were followed by meetings and a case study.

October 1975 - Some 550 information packets which included a summary of the 208 project, charts indicating identified sources of point and non-point pollution by river segment, and present and future water quality classifications were sent to chief executives, MAPC reps., heads of planning boards, conservation commissions, boards or departments of health, public works departments or sewer commissions, zoning appeals boards and finance committees. A majority of the only forty-one (of 550) responses indicated a preference for meetings with officials of neighboring communities as a next step.

These requests were honored by a series of local official workshops which took place between January 1976 and February 1976.

Local Officials Workshops - Six evening and two morning workshops were held throughout the 208 area in: Marshfield, Sudbury, Newton, Danvers, Millis, Medford, Weymouth and Norwood for the purpose of presenting and evaluating initial plan outputs; identifying water quality problems; DeFacto pattern, environmental pattern, identifying pattern conflicts; preliminary identification of potential structural or non-structural solutions by basin; and potential conflicts and tradeoffs.

Some 180 local officials attended and several adjustments were made in planning data and maps based on input received at those meetings. The press and general public attended several of the sessions. Major local concerns focused on growth, the authority invested in 208, its effect on local autonomy, 208 relationship to 201, MAPC interface with other studies, water supply and ground-water protection.

May - June 1976 - A series of nine public workshops (one per basin) was held to explain 208 to the not previously involved public and to further identify local issues and concerns. Approximately 400 people including many local officials attended, of the 800 local officials plus 1500 additional key interest groups and people invited. Wide media publicity also notified the general public. Issues discussed included: sewering and its relationship to growth, needs for clean and sufficient water supplies, need for verification of MAPC data prior to making recommendations, concern that funding was available for structural solutions only, and that 208 look at new technologies.

Advisory Committee Activities

Areawide Planning Advisory Committee - September 1975-June 1976
seven meetings on 208 issues

Citizens Advisory Committee - November 1976 - June 1976
ten meetings on 208 issues

Consultant Selection Committee - September 1975 - June 1976
six meetings regarding choice of consultants

Technical Subcommittee - October 1975 - June 1976
twelve meetings discussed technical issues 208

Joint Public Participation Task Force - May 1976 - July 1976
twelve meetings to review, update and monitor
Public Participation Program

Joint Impact Assessment Task Force - May-June 1976
three meetings to discuss impact categories
and weighting systems.

Watershed Association Activities - March-June 1976

Both the CAC and the APAC have through their constructive criticisms of report outlines and partial drafts improved the readibility of all 208 reports. Their comments have considerably improved both the organization and presentation of material.

In addition, the CAC has concerned itself with water supply legislation:

S-400 (now S-1449)
The 208 Project's Citizens Advisory Committee's Water Supply Task Force developed Senate Bill No. 400 and had it filed with the State Legislature by Senator Edward Burke. S-400(now S-1449) is an attempt to protect Massachusetts groundwater resources by requiring communities wishing to join MDC's Water District, or to make substantial additions, to first demonstrate utilization of water conservation measures. The bill passed its first hurdle by being reported out of committee favorably (Joint Committee on Natural Resources and Agriculture). MDC concerns have been resolved and Secretary Murphy of the Executive Office of Environmental Affairs indicates that passage of the bill is now a high priority in her office. 208 has been providing staff support to the Task Force.

Watershed associations conducted a series of 208 activities, under MAPC contracts, attended by citizens, local officials, environmental interest groups and business and industry representatives. Highlights included:

Charles River Watershed Association Workshops on River Recreation and 208; Water Weeds.

Neponset Conservation Association "River Revel"
Fowl Meadow, Milton.

SuAsCo Watershed Association - Canoe Trip on Sudbury, Assabet, Concord Rivers; displays, etc.

North/South Rivers Watershed Association - Workshop on History, Wildlife, and Flora of North and South Rivers.

Technical Assistance - August 1975 - June 1976

Sixty-four meetings distributed throughout some forty-nine communities were held to provide technical assistance to local officials from the MAPC staff on a variety of water quality related problems.

The first three stages of the public participation process were followed by the staff function of incorporating all available data with that gathered by MAPC consultants into the nine preliminary basin reports which were distributed between June 1977 and January 1978.

The public review mechanisms for the North-South Rivers Basin for example were essentially the same for each of the nine basins. The mechanism for review was an outgrowth of the Process and Time Line procedure for each 208 product developed in February 1977 by the MAPC Executive Director and the 208 Project Manager and approved by the Executive Committee. The public review period incorporated a minimum 35-day reading and commenting cycle uniform for each basin. The preliminary basin report was accompanied by an "Action Handbook" with questions designed to help readers with their participation in and understanding of the report as well as to solicit written comments which could be utilized in developing the areawide plan. The exercise was designed to help towns develop the comprehensive management program best suited to their needs.

Readers were actively recruited by telephone by MAPC staff and watershed coordinators from each of the basin towns in advance of the report distribution and included interested citizens, local officials and business representatives. Ten copies of the report and handbook were also delivered to the town libraries. Press releases and watershed newsletters announced availability of the reports and the meeting date.

Approximately 300 reports were distributed to interested readers. Some dozen readers returned "early responses" within two weeks of report distribution. These were helpful to staff in preparation for the public meeting held in Norwell with some seventy participants. Following the review period, an addendum was prepared for all readers, advisory committees and staff which reviewed some 60 sets of comments, questions, and concerns received, provided staff responses, and referenced errata within the report. The addendum was distributed as the "second draft" and clarified and/or corrected out of date information, data discrepancies, etc. Addenda for each preliminary basin report clarify, correct and update the preliminary reports and serve as the basis for their respective sections of the areawide plan. They are formally reviewed by the state (DEQE), and the Executive Committee of MAPC.

II. INFLUENCE OF PUBLIC PARTICIPATION ON THE AREAWIDE PLAN

The nine preliminary basin reports, the Regional Septage Disposal Alternatives report, and the Areawide Water Quality Management Alternatives report were submitted for public review and comments over the past eight months. Public meetings were conducted within each basin for the purpose of discussing preliminary findings and the range of alternatives available for solving community-specific water quality problems within the basin context.

All written comments and criticisms, meeting tapes, and advisory committee minutes were considered by staff in pulling together addenda for each of the nine preliminary basin reports as well as for developing community-specific recommendations within the regional context required under the law.

All comments were reviewed again for consistency with the recommendations being made in this Draft Areawide Plan.

Two types of examples have been selected here. The first (A) refers to communities where public input following their review of the preliminary basin report indicated non-agreement on some issues and/or preliminary recommendations. The second (B) set of examples illustrates communities where there was substantial agreement on issues and/or preliminary recommendations. (These examples are drawn largely from the nine-basin report addenda which were distributed to all persons who received the basin report or attended a public meeting. The addenda are themselves a step in the participation process.)

A. Non-Agreement Examples. The following towns illustrate the process of reaching mutual agreement utilized by staff in developing realistic solutions to water quality problems:

Littleton - SuAsCo Basin

Littleton established an ad hoc committee for the review of the SuAsCo Preliminary Basin Report with representatives from the Board of Selectmen, Board of Health, Water Commission, Conservation Commission, Finance Committee, Industrial Commission and Planning Board. That committee, following their review, through their Board of Selectmen notified the MAPC 208 staff that:

"1. We reject the Preliminary SuAsCo Basin Report in its present form.

2. We request that MAPC develop and include an Alternative III consisting of non-structural solutions to Littleton's water quality problems.

3. We request that MAPC staff members meet with Littleton representatives in Littleton to discuss with us our comments and methods of revising the report."

In essence the review committee felt that the distinction between the two alternative programs presented in the preliminary report as examples for managing water quality programs, (Alternative I emphasizing structural solutions and Alternative II emphasizing non-structural solutions) was not significant for Littleton and its water quality problems.

Invitations were made by MAPC at all public basin meetings for communities who wished to discuss the report further to indicate a time and place convenient for such a meeting. Littleton was one of a dozen such communities who responded to this invitation.

MAPC staff subsequently met in Littleton with the ad hoc committee and received additional comments and constructive criticisms on the preliminary basin report. At that meeting the purpose of the preliminary report and its subsequently released "Regional Septage Disposal Alternatives" report which specifically delineated a "no-sewer alternative for presently unsewered communities were clarified and a mutual understanding of the alternatives issues reached.

The ad hoc committee discussed the issues further and reached the conclusion that "We desire and expect to continue in Littleton to rely primarily on individual septic systems to dispose of waste water...The water quality of our surface waters we see as improving in the long run through the repair and maintenance of existing septic systems and through strict regulation of new septic system location and construction... We believe that the continuation for the indefinite future of disposal of waste water in Littleton through septic systems will best serve both state and local needs."

Staff concurred with Littleton's reasonable implementable desires and among our recommendations under Wastewater Treatment are:

- the town continue to rely on on-site systems for wastewater disposal;
- the town should develop and implement a program of septic system maintenance and inspection.

Holliston - Upper Charles River Basin

Holliston options delineated in the Upper Charles Preliminary Basin Report as being "very appropriate" (short range) for consideration as solutions to existing water quality problems included the management and maintenance of septic systems and traditional sewerage. Those deemed as "appropriate" also were package plants with limited sewerage, communal septic systems with limited sewerage, and the reconstruction of individual on-lot septic systems.

Holliston relies entirely on on-site septic systems for wastewater disposal and has yet to find a system which has failed but which could not be rebuilt. In view of this, the work of the town's Septage Treatment Investigative Committee, and the fact that a septic system maintenance and inspection program is being developed, the staff recommends that the town should continue to rely on on-lot methods of wastewater disposal, i.e. septic systems and that they continue the study of alternative methods of septage disposal.

The preliminary report also carried a staff recommendation that the town operated landfill off Marshall Street be promptly closed and carefully sealed to minimize long-term impacts. We acknowledge that Holliston has contacted a consultant to bring the landfill into conformance with current practice and standards. The town has an application before the state to move the landfill to the north of the existing site on newly acquired property.

The 208 staff therefore recommends that the Marshall Street landfill be monitored to develop an effective plan for closure which will protect the underlying aquifer which plays an important role in Holliston's water supply from contamination.

The preliminary report also indicated that the water supply in Holliston had sodium levels which exceeded 20 parts per million. The Maple Street well was particularly high in salt contamination. Holliston voted funds at a Special Town Meeting to place a roof on the salt shed. It is now in place. Staff recommends that the town develop a sensitive salt application program which identifies areas where salt application should be kept to a minimum.

The town raised a concern that recommendations for storm water management should not just appear in a final report but should be reviewed locally. The 208 staff considers the stormwater management program in Holliston adequate. We recommend to the town that in planning for future development, maximum use should be made of natural drainage and non-structural runoff control measures.

Newton - Lower Charles Basin

In Newton approximately 7% of the population of Newton is served by septic systems for on-lot sewage disposal. The Lower Charles Basin Preliminary Report stated that the few scattered unsewered areas of Newton are largely unsuitable for subsurface disposal systems due to bedrock and a high water table and that potential problems are likely in those areas. Staff suggested therefore that if problems did occur and there were no sewer line available, a viable solution would be to extend the sewer line to these locations. Water conservation measures were also encouraged.

The City Engineer for Newton assures us that every subdivision is required to provide sanitary sewer service to each lot therein. Potential problems are therefore not likely in the few scattered unsewered areas, whether or not they are suitable for subsurface disposal.

Because the presently unsewered sections occur mainly in areas with ledge, sewering may be prohibitively expensive. Staff therefore recommends that:

- the city evaluate the cost effectiveness of sewering non-sewered areas with both conventional sewers and/or vacuum pressure sewers;
- the city develop a preventive septic system maintenance and inspection program;
- the city promote water conservation to reduce wastewater flows.

Staff preliminary management recommendations for Newton were:

- The stormwater system should be studied to identify the catch basins within the system which would serve as a basis for developing a program of annual catch basin cleaning for key basins, more frequent cleaning in problem areas and less frequent cleaning in the remaining catch basins.
- Regular programs of outfall, channel and stream inspection and maintenance should be developed and implemented.
- A street sweeping program should be developed to augment catch basin cleaning activities in heavily developed areas.

The Newton City Engineer informs us that following the development of the currently funded aerial photogrammetric survey plans of the city, existing watershed areas will be identified and examined for adequacy of runoff capacity, designs will be prepared to reduce localized flooding potential through both pipe replacement programs and the development of additional retardation or ponding areas where feasible, thereby permitting a regular prioritized maintenance outfall and catch basin cleaning program to be implemented. Street sweeping is a regular continuous service.

The 208 recommendations have been adjusted and include:

- The stormwater system should be studied to identify the catch basins within the system which would serve as a basis for developing a program of annual catch basin cleaning for key basins, more frequent cleaning in problem areas and less frequent cleaning in the remaining catch basins

- Regular programs of outfall, channel and stream inspection and maintenance should be developed and implemented.

The discussion of landfills in the preliminary report referenced an ash landfill off Rumford Avenue adjacent to the Charles River, where some leachate was reported to be draining from the site to the adjacent river. MAPC recommended that the site should be monitored to assess the nature and extent of measures required to properly seal the facility and mitigate any continuing impacts. Periodic monitoring after sealing is advisable to assess the adequacy of the closing procedure.

The Newton City Engineer informs us that the entire length of reinforced concrete pipe beneath the Rumford Avenue site has been inspected and certified sealed. Upstream, at the old Pine Street dump site, they suspect the condition of an old corrugated metal pipe to be the most probable source of leachate intrusion. The city plans to replace that pipe in 1978 in conjunction with the Pine Street playground improvement project.

Newton writes that they have not been advised that any leachate originating on-site (Rumford Avenue) has been observed or measured and strongly urges that any assessment of same cannot be accurately made from water-quality testing of the cove water until after the Pine Street pipe replacement and dredging of the cove are accomplished.

Accordingly, the 208 plan recommends that the former Rumford Avenue ash landfill be monitored to assess the nature and extent of measures required to properly seal the facilities and mitigate any continuing impacts.

Wayland - SuAsCo Basin

Wayland town officials also met with the 208 staff subsequent to the SuAsCo basin public meeting to update and correct water quality data. The preliminary report in a discussion of failing septic systems in the area around Dudley Pond suggested that Wayland construct sewers which would be connected by interceptors to the MDC sewerage system. The preliminary report further suggested that where it was not possible to replace or expand an old or inadequate system, a frequent schedule of mandatory pumping should be enforced.

Wayland town officials indicate (refer to SuAsCo Addendum, Wayland comments, Appendix C) with respect to the installation of sewers in problem areas:

- "No current action of intention to act. Strongly opposed by Wayland."

As to regular inspection and maintenance of septic systems:

- "No current action or intention to act... It is intended that some kind of program to encourage proper maintenance of septic systems will be instituted when the septage-disposal facility has been constructed."

The 208 staff acknowledges the development of a joint regional (Wayland and Sudbury) septage treatment facility and anticipates that all will proceed well. Under these circumstances, it is recommended that:

- the town continue to rely on on-site wastewater disposal via septic systems;
- the town should develop and implement a program of preventive septic system maintenance and inspection to ensure the continued viability of on-site systems;
- the town together with the town of Sudbury, continue towards the implementation of the joint regional septage treatment facility.

For the prevention of potential problems, the preliminary report included recommendations for rigorous site plan review including individual lots, grading and slope protection regulations, and rezoning to reflect the development capability of the land. Wayland comments included:

> "Rigorous Site Plan Review:
> Site plan review has been practiced in Wayland for many years, with increasing rigor as time passed. A comprehensive review and revision of Wayland's zoning by-law to be voted upon in 1978 will probably increase further the rigor and scope of the review process.
>
> Grading and Slope Protection Regulations:
> Steep slopes are not now protected in a comprehensive manner. There are relevant standards scattered throughout the by-laws and regulations of the town. In addition, a considerable amount of protection is exercised on an ad hoc basis by individual boards during the review process.
>
> Zoning-District Changes:
> No such action is presently contemplated, but the subject has not recently been discussed before the SuAsCo report was received. It now appears that there is some sentiment in favor of a review of this possible solution."

The 208 staff acknowledges the above comments and has not delineated them in the recommended 208 plan.

Concord - SuAsCo Basin

Concord owns and operates a secondary wastewater treatment facility which discharges, under an agreement with the Fish and Wildlife Service, to the Great Meadow Wildlife Refuge adjacent to the Concord River. Under the 1963 agreement, the Department of the Interior can require Concord to move the discharge from the refuge if it determines that discharge to be harmful to the refuge. The Fish and Wildlife Service has determined, based on an EPA field survey of October 1976, that the discharge of effluent to the Great Meadow Wildlife Refuge is harmful.

Concord has informed staff that it has recently completed a major capital improvements program at their treatment facility including reconstruction of the nine sand filter beds and under drain systems and removal of the septage disposal pits. Based upon this new information and more recent data collected at the discharge and on the Concord River above and below the refuge which demonstrates the ability and utility of wetlands to remove the effluent, mitigating its potential impact on the river, staff does not feel there is adequate demonstration at this time that the discharge is harmful to the refuge.

MAPC therefore recommends that EPA, DWPC, Fish and Wildlife Service, and the Town of Concord initiate and participate in an EPA funded Environmental Impact Statement. The purpose of this would be to evaluate the impacts of leaving the discharge to the refuge or of modifying the type of effluent discharge system. It would also determine the costs and impacts the additional levels of treatment would have if the discharge were to go directly to the Concord River and the impacts other land application alternatives not associated with the refuge would have.

B. Substantial Agreement Examples. The above are representative of community comment and input on preliminary recommendations which remolded the recommendations made in the draft 208 Areawide Plan. The following are examples of the many instances where public participation and communication resulted in confirmation and substantial agreement on issues and/or recommendations:

Braintree - Weymouth Basin

The people of Braintree were asked to read the report and to respond to preliminary recommendations. Their responses are summarized after each of these recommendations:

- Sewer potential problem areas:
  The recommendation to sewer areas of potential septic system problems as they are developed was acceptable to the respondents. The only reservation expressed was in regard to the input of additional sewering on the MDC's capacity to treat the added water without damage to water quality in Boston Harbor.

- Upgrade and monitor landfill:
  There was general acceptance of the recommendations regarding monitoring and upgrading of operations at the Braintree landfill. The question of who pays for monitoring was raised. At present the responsibility for operating the landfill within state regulations rests with individual municipalities. The 208 Management Alternatives report contains recommendations for more state DEQE and DWPC activity in monitoring and more staff resources to do the job. If implemented these suggestions would relieve the towns of the monitoring costs and also remove the conflicts present in the expectations that a town will vigorously enforce state regulations which could lead to costly landfill improvements.

- Careful selection of new ash disposal site:
  Respondents agreed with the suggestions for careful selection, operation and monitoring of a new ash disposal site for the town incinerator. Solid waste source reduction was suggested.

- Regional resource recovery or regional sanitary landfill:
  The suggestion that Braintree join a regional resource recovery program, if available, or a regional landfill after the life of the incinerator was generally accepted. A question of location was raised, but this cannot be determined for some time by the appropriate state, local and regional bodies.

- Stream buffer district:
- Water resource protection district:
  The suggestions for local stream buffer districts or a more comprehensive water resources protection district to prevent future water pollution were generally accepted. In response to questions about how such techniques could be applied, staff will develop model by-laws for local consideration.

- Storm water management practices:
  The stormwater management practices, especially to protect waters which might become drinking water supplies, were fairly well received. One respondent raised questions about cost relative to the benefits which cannot be fully answered at this time. The cost of focusing existing management practices on critical water bodies may not result in excessive costs for the benefits received. Sampling before and during such an effort can refine the program and make efficient use of resources.

- Wetlands and floodplain zoning:
  In response to the staff's suggestions for protecting Braintree's remaining wetlands, floodplains and reservoir watersheds, the issues were somewhat confused. One respondent said that Braintree already has wetlands and floodplains zoning, another said it wasn't needed and another said that it should be adopted. We hope to get clarification from Braintree, and we will let the original suggestion stand until then.

- Road salt management practices:
  Staff recommended a set of management practices to control the application of road salt and the resulting impact on water quality. The respondents agreed, one suggesting a search for a non-polluting alternative to sodium chloride.

Weymouth - Weymouth Basin

Weymouth citizens and local officials studied and responded to the following recommendations:

- Sewer existing problem areas:
  The staff suggested sewering three areas with current septic system problems, partly because the town is 70% sewered and has plans to sewer the remainder in phases. The respondents generally agreed. The East Weymouth Civic Association called for the problem area near Whitman's Pond to be sewered first. The League of Women Voters agreed with sewering the Whitman's Pond area and asked if package plants would be suitable for the other two areas. (They would not be economical and would duplicate planned MDC treatment capacity.) One respondent expressed concern with the effect of sewering on the town's wetlands.

- Correct Fore River sewage overflows:
  Respondents generally agreed with the MDC's plans to build a relief siphon to correct overflows of raw sewage into the Fore River near Weymouth Landing. A Conservation Commission response noted that work on the project has begun and that Conservation Commission permits had been issued.

- Close and seal ash disposal site:
  The staff noted that leachate is being generated from the area of the closed Weymouth incinerator and ash disposal site as it enters a tidal marsh near the Back River. Respondents generally agreed with the recommendations for an impervious cover layer topped with vegetated loam and other closing and sealing practices acceptable to the state DEQE.

- Evaluate Back River shellfish:
  All respondents agreed with the staff recommendation for evaluation of the safety of shellfish harvesting at the Back River area. The potential problem comes from the tendency of shellfish to concentrate metals and other toxic substances in the leachate from the closed incinerator and ash disposal site. A Conservation Commission respondent noted: "at least one area contains highly toxic metals from incinerator ash wash down. This condition may exist for years and may require special treatment."

- Regional resource recovery in future:
  Although Weymouth's use of the regional sanitary landfill at Plainville is appropriate into the intermediate future, staff suggested cooperation with other communities at some future time on a regional resource recovery program. Most respondents agreed with the suggestion. However, one respondent would place the emphasis on source reduction and separation of recyclable material. And the East Weymouth Civic Association felt that regional solid waste disposal options posed a threat to home rule: "Each town should solve their own problems. Weymouth should look at the large hole between Route 3 and Libbey Industrial Parkway."

- Stormwater management practices:
  Staff recommended several management practices for the town's stormwater drainage systems, including continuation of the current operation and maintenance program and sampling of beach areas after rainfall. There was general agreement with the recommendation. One respondent added a suggestion for maintenance upgrading of older storm drains now overloaded due to growth in the town. Another suggested required green areas and planting around new developments and parking areas, roads, etc. to control storm runoff pollution. However, one respondent pointed out the time lag in getting sampling results and the fact that sampling needs might conflict with municipal employees work hours. If the recommended sampling was intended solely to be used to determine which days to permit or prohibit swimming, the objection would be significant. However, the sampling was proposed to provide a data base for deciding whether additional management practices or other measures are needed to provide protection to the bathing beaches.

- Wetlands and floodplain zoning:
- Stream buffer district:

  All respondents agreed with the staff recommendation for immediate consideration of wetlands and floodplain districts and stream buffers. Several respondents gave highest priority to this idea. A Conservation Commission respondent noted: "A floodplain study for Weymouth is in progress and should be ready in 1978. This will be followed by a floodplain zoning by -law to be submitted to the Town Meeting for acceptance." All agreed with the stream buffer suggestion, but one respondent felt that it might be too late because of the level of development in Weymouth.

- Aquifer protection district:
- Watershed protection district:
- Water resource protection district:

  All respondents agreed with the staff suggestion that the town consider adoption of an aquifer protection district and a watershed protection district to avoid a projected conflict between future growth and areas of groundwater recharge and surface reservoir. A Conservation Commission respondent noted that the Commission "has endeavored to place restrictions on activities adjacent to streams, lakes and all wetlands in the Order of Conditions."

- Inspect and rehabilitate septic systems:

  The suggestion that Weymouth initiate a program of inspection and maintenance (pumping) to extend the life of septic systems received a mostly negative response. Several respondents felt that the town's sewering plans would eliminate most septic systems and make such a program unnecessary in a few years. The East Weymouth Civic Association objected on home rule grounds to the suggestion that communities could jointly hire and share additional staff for such a program. A League of Women Voters response favored the suggestion, agreeing, in part, that "individual homeowners should not be penalized for poor land use planning by the town. Septic (system) owners subsidize sewerage to others, why not vice versa?"

- Road salt management practices:

  All respondents agreed with the management practices suggested for the prevention of road salt contamination of surface and ground water. It was noted that Weymouth has already taken some steps to prevent contamination. The League of Women Voters respondent questioned..."whether the no-salt policy near water supplies is actually practiced fully at this time." The Conservation Commission noted that in its orders of conditions it..."prohibits the use of sodium chloride for de-icing roadways and parking areas where storm runoff would enter public drinking water supplies. Two respondents pointed out the importance of state DPW cooperation in its road salting operations.

- Back River as Scenic River:

  All Weymouth respondents favored the idea of Scenic Rivers designation under Massachusetts law for the Back River. Several gave it highest priority among the solutions discussed. In addition, state Rep. Robert Cerasoli and others spoke at the public meeting in favor of designation.

Arlington - Mystic Basin

During the public review period for the Mystic River Preliminary Basin Report, responses were received from Arlington in writing and/or through public meeting comments.

All of the Arlington respondents agreed with the management practices suggested by the staff for control of pollution from stormwater runoff. Two respondents corrected an oversite by pointing out that Arlington presently has a street sweeping program. One proposed enforcement of the town's "often disregarded leash law." (See the available MAPC 208 Stormwater Report and Areawide Plan for more on stormwater pollution controls in the Mystic River Basin).

There was general agreement with the staff's suggested program for reducing pollution from the excess use of de-icing salts on state and local roads. The Arlington Department of Planning and Community Development and the Public Works Department added a precaution: "Some of these recommendations may be appropriate; however, it should be noted that two-thirds of Arlington streets are sloping (many steeply) and thus salt/sand use cannot be reduced without significant reduction in safety."

All respondents agreed with the staff concurence on Arlington's plans for a new salt storage shed... hardly surprising since, we are informed, the shed is now nearly built.

The staff suggestion that Arlington plan to sewer a small area near its Belmont border if and when the area is developed produced some confusion. The Department of Planning and Community Development wrote: "Arlington is now entirely sewered." Presumably the town does not anticipate and will not permit development of the area and, in that case, the suggestion can be withdrawn.

To deal with landfill leachate in Reeds Brook and Arlington Reservoir, the staff proposed monitoring "to update a previous study and, if indicated, the previously recommended leachate collection system should be built. The Department of Planning and Community Development responded: "An engineering feasibility study by Camp, Dresser and McKee is about to commence which will assess this problem. The amount and type of pollution will be measured and alternative means of alleviating the problem analyzed."

To deal with Arlington's future solid waste disposal problem without environmental damage, staff suggested exploration of regional resource recovery options. The town appears aware of the options and is exploring them and their economic factors.

Staff recommended adoption of floodplain zoning along the Mystic River, Alewife Brook and Little River. The town obviously is in agreement, having adopted floodplain and wetland zoning for the area prior to our recommendation.

Staff suggested consideration of an aquifer protection district in Arlington to preserve groundwater recharge areas. Several respondents agreed. The Department of Planning and Community Development had some reservations: "It is not known how valuable or extensive aquifers under Arlington are. More information on this matter would be desirable. It is not likely that significant additions will be made to impervious areas in Arlington since the town is almost entirely developed." The suggestion should be kept in mind and considered in light of new information being developed on the aquifers in the basin.

Malden - Mystic Basin

During the public review period for the Mystic River Preliminary Basin Report, responses were received from Malden in writing and/or through public meeting comments.

The staff recommended management practices for the control of pollution from stormwater runoff. Both the City Engineer and the principal planner for the Malden Planning Board agreed with the recommendations.

The staff had identified small areas of Malden for future sewering if and when they are developed. This appears consistent with the city's past policy. Respondents agreed with the recommendations.

Several small areas in Malden have septic system problems. The city plans to connect them to municipal sewers within three years. The staff and respondents all agree on this.

The staff recommended a comprehensive approach to protection of water supplies from road and salt contamination. The staff recommendation noted the need for local judgement in light of highway safety, terrain and other considerations. The respondents agreed with it but added comments. The City Engineer noted that the "only possible surface reserve water supply for the City of Malden would be Fellsmere Pond (owned and controlled by the MDC) and this is located in the hilly hospital area, therefore salting in this area is essential." The principal planner suggested an emphasis on "slower speeds and safe driving habits during times of snow and ice cover."

The staff recommended careful monitoring of the City's salt/sand pile and a covered shed if contamination is found beyond the site. Respondents agreed and noted that a storage shed is planned in the new city yard to be built on Commercial Street.

Staff suggested "that the adoption of wetlands protection districts would be a useful regulation in Malden to supplement the protection of wetlands already somewhat protected through public ownership. The City Engineer agreed but the principal planner felt that the "only viable wetlands area remaining in Malden is in public domain."

Respondents disagreed with the staff suggestion for adoption of floodplain zoning along the Malden River. The City Engineer noted that the revised HUD flood hazard boundary map (5-24-77) shows the banks of the river at the limits of the floodplain. The principal planner commented: "No - the area is mostly prebuilt; has or is in the process of urban renewal and is protected by the Amelia Earhart Dam." The revised HUD floodplain maps can define the floodplain for our purposes.

Staff suggested consideration of aquifer protection districts in Malden to protect the remaining groundwater recharge areas. The City Engineer disagreed. The principal planner agreed but with reservations regarding industrial, commercial or transportation core areas. This issue can be reconsidered when a current study of basin hydrology is completed.

Staff suggested consideration by Malden of a watershed protection district for the Fellsmere Pond area. The City Engineer disagreed, saying: Fellsmere Pond and the contiguous watershed is owned and controlled by the MDC. The development in the balance of the watershed has been completed." The principal planner agreed with the staff suggestion, "as long as this will not limit reasonable residential development in the vacant areas north and west of the pond." The respondents may be thinking of slightly different areas, in which case the fault is ours since we did not include a map of the non-structural proposals in the report because of the small areas involved and the scale of the report maps. We will hold the suggestion for discussion with city officials at a future date.

Reading - Ipswich Basin

Community officials comments on the Ipswich River Preliminary Basin Report for Reading were in substantial agreement with the solutions options identified for Reading. Their comments are summarized below. Essentially Reading, already substantially sewered by the MDC, prefers that only the existing land development component of the potential sewer service areas as delineated should be sewered. They stress that land use decisions, including those involving wastewater disposal, should give consideration to the need for recharging the watershed.

In indicating their preference for "Minimized Sewer Service: Abatement of Existing Problems Only" their reasons included:

> " The Town of Reading recognizes that groundwater recharge is a very important aspect of the water supply facilities of downstream communities and the continued transport of potential recharge water out of the basin will have devastating impacts on the future water supply of communities within the basin.
>
> Wherever possible, non-structured solutions and protective measures should be implemented to improve, protect and provide future water supplies.
>
> A possible addition to any of the concepts for communities which will be sewered would be the implementation of an all-out program for water conservation. Reading, for example, is an MDC member community and all of the water discharged into it is derived from the Ipswich River Basin. It therefore follows that the downstream communities will benefit from a water conservation program in Reading.
>
> It should be the duty of the towns sewered (due to soil conditions, etc.) to implement water conservation programs if we are to expect other communities to provide zoning changes which will protect existing water recharge areas."

In additional response and agreement to recommendations that:- 1.) A program of outfall and receiving stream inspection and maintenance should be developed and implemented and 2.) in site-planning for future land development, maximum use should be made of existing drainage systems, natural drainage patterns and non-structural runoff control measures (in areas where no drainage system presently exists), their reasons for agreement included:

> "Measures to protect public property from potential flooding conditions and to help avoid causing drainage problems due to the combination of increased runoff of upstream basins.
>
> Water quality and quantity in the Ipswich River is dependent on the maintenance of the integrity of the watershed system. Adequacy of flow rates is accomplished by periodic cleaning of tributary channels. Such inspection programs also provide continual monitoring of potential pollution sources.
>
> Plans for future land alterations must be preceded by a thorough study of the existing land functions. Proposals should utilize existing systems with minimal alteration to the natural system. Recognition of the multiple functions within a natural system must be recognized and protected to insure preservation of high quality water and maintenance of continued flow and quantity."

With respect to water conservation questions:

- If your community is already sewered, expects to be sewered, or has any prospects of becoming sewered within the foreseeable future, particularly if the treated wastewater is discharged into the ocean, would you and your family be interested in participating in a local water conservation program? Response:
  Yes. Reading faces a problem with out-of-basin transport of its wastewater. Utilizing the Ipswich as a water supply, maintenance of the stream flow and groundwater recharge become important considerations. Increased out-of-basin transport due to structured solutions to wastewater management have a negative effect on water supply.

- Under the same conditions as described above, would a civic organization or municipal body (board, commission, committee or department) in your community be interested in instituting a voluntary water conservation program? Response:
  Yes. The Reading Conservation Commission has been awarded a grant from the Middlesex Conservation District to develop an education program on water conservation. This program is expected to be implemented in early 1978. Discussions have been inititiated with the Department of Public Works in Reading to consider implementation methods for water conservation.

- If so, which local organization or body? Response:
  Conservation Commission; Department of Public Works.

C. Other Publications. The MAPC Water Quality Project's report on "Areawide Water Quality Management Alternatives" was completed in January, 1978. Copies of the report were distributed to public officials, interested agencies and groups and individuals in the MAPC 208 area. On February 22, 1978 the MAPC held a public workshop on the report at the Federal Reserve Bank. This workshop consisted of a brief explanation of the report by the staff member responsible for its preparation and a panel discussion on the water quality management issue was held. Participants in this panel discussion included Carla Johnston, Executive Director of MAPC; Daniel McGillicuddy, DEQE; John Dalton, water quality management consultant; Judith Pickett , Conservation Law Foundation; and Ed Taipale, MAPC. The Water Quality Project's Citizens Advisory Committee and Areawide Planning Advisory Committee also reviewed the document. The Citizens Advisory Committee reached a general consensus on the desired approach to water quality management in the MAPC 208 area. Comments received from local officials and citizens generally favored the maximization of existing institutional capabilities in formulating an areawide water quality management approach. This preference is reflected in the management recommendations of the draft areawide plan.

A report entitled "Regional Septage Disposal Alternatives in the MAPC 208 Area" was published in December, 1977 and sent out for review and comment to local officials, 208 advisory committees, state and federal agencies, and MAPC representatives. A public meeting/workshop on septage disposal was held on January 24, 1978 at which several representatives of local governments as well as state and federal agencies cast their views on future septage disposal alternatives. Several people sent in written comments. This review process led to the refinement of several disposal options which appear in various communities as recommendations for septage disposal.

A report entitled "Analysis of Urban Stormwater Runoff and Combined Sewer Overflows in the Boston Metropolitan Area" was released to the public in February, 1978 for review and comment to local officials, 208 advisory committees, meetings,state and federal agencies and MAPC representatives. A number of written comments have been received. Those which were received in time have been worked into this draft plan/EIS. Others will be accommodated where appropriate in the Final Plan/EIS.

III. PUBLIC INFORMATION

MAPC's planning process has also utilized public information and public appearances as vehicles for helping to establish a firm base of public understanding. Efforts to reach the public have resulted in appearances before dozens of audiences such as professional organizations, civic and social groups, and classrooms. In addition, project staff have appeared on numerous radio and TV shows, plus several news spots. News releases and letters-to-the-editor printed in area papers have numbered in the hundreds. Examples typical of these public appearances include - March 20-26,1977 was National Wildlife Week and that year's theme was "We All Need Clean Water". John Harrington, former 208 Project Director, and Rita Barron, Executive Director, Charles River Watershed Association were guests on Channel 5 - Sunday Open House, March 13. Joe McGinn spoke on urban runoff on Channel 2, March 14. Ruth Caplan, 208 Coordinator for Mystic River Watershed Association spoke on urban runoff on Channel 7 on March 15. John Harrington was also a guest on the Tom Larsen Show, Channel 38, March 22 speaking on water quality planning. Persis Sterling, 208 Coordinator for the North/South River Watershed Association was also a guest on that program.

EPA commended the 208 staff for its efforts in conjunction with the Massachusetts Wildlife Federation's wildlife week by saying in part, "the TV coverage was timely and well conceived. Those staff and watershed association persons who participated in the interviews and news broadcasts were well informed and effectively conveyed their message to the public... as a result of this effort the public has a better appreciation of the need to improve and protect the quality of our valuable water resources."

Further: Carla B. Johnston was speaker on June 8, 1977 for the EPA panel on Barriers and Incentives to Improving Industrial Pollution Control. Other panels were convened for: Legislative Impact on Process Change; Process Change and Energy Benefits; Managing For Improving Environmental Performance; and Selection and Implementation of Pollution Control Programs.

Staff worked in coordination with the American Lung Association on their conference entitled "Air and Water Quality in Essex County". 208 displays and discussions were presented at both the February and March conferences.

208 staff participated in the annual meeting of the Essex Conservation District explaining the 208 program and coordination with the district.

Staff presented the 208 slide show to the Salem Conservation Commission. Coordination with this group has been maintained throughout the project. The Commission has applied to EOEA to have the Forest River designated as a "scenic river".

Water conservation was the topic for Ann Conway of the 208 Public Participation Team on Channel 4's Woman "77 show on April 14 and for the New England Today show on Channel 56 on April 29. Some ninety requests for further water conservation information were answered. Conservation will also be the topic for her appearance on Channel 5's Good Day show on May 27th.

Richard Cadwgan of the 208 staff and Jack Pierce, Chairman, Ipswich River Watershed District Commission, appeared as guests on the New England Today show, May 9 to discuss the 208 project, water resource issues and to stress the need for water resources planning and coordinated development of ground and surface water supplies.

Planning and technical assistance was provided to the Essex County Extension Service and to the Water Supply Task Force of the Ipswich River Watershed Association for their April 2nd conference attended by approximately 60 Ipswich Basin and North Shore residents. Dick Cadwgan spoke about 208 and its relationship and positive value in North Shore Water Resources planning. The 208 display was presented. The day stressed the coordination and cooperation among communities and government agencies to avoid an impending water crisis in the North Shore.

MAPC Executive Director Carla B. Johnston was a guest speaker in early May, 1977, for the Massachusetts League of Cities and Towns Conference: Environmental Management, Who's In Control..."

"GLOSSARY OF WATER QUALITY TERMS"

abatement: The method of reducing the degree or intensity of pollution, also the use of such a method.

Act, the: Public Law 92-500 - "Federal Water Pollution Control Act Amendments of 1972".

activated sludge: Sludge that has been aerated and subjected to bacterial action, used to remove organic matter from sewage.

activated sludge process: The process of using biologically active sewage sludge to hasten breakdown of organic matter in raw sewage during secondary waste treatment.

advanced waste treatment: Waste water treatment beyond the secondary or biological stage that includes removal of nutrients such as phosphorus and nitrogen and a high percentage of suspended solids. Advanced waste treatment, known as tertiary treatment, is the "polishing stage" of waste water treatment and produces a high quality effluent.

aeration: The process of being supplied or impregnated with air. Aeration is used in waste water treatment to foster biological and chemical purification.

aerobic: This refers to life or processes that occur only in the presence of oxygen.

agricultural pollution: The liquid and solid wastes from all types of farming, including runoff from pesticides, fertilizers and feedlots; erosion and dust from plowing, animal manure and carcasses and crop residues and debris. It has been estimated that agricultural pollution in the U.S. has amounted to more than 2½ billion tons per year.

algal bloom: A proliferation of living algae on the surface of lakes, streams or ponds. Algal blooms are stimulated by phosphate enrichment.

anadromous: Type of fish that ascend rivers from the sea to spawn.

anaerobic: Refers to life or processes that occur in the absence of oxygen.

APAC: Areawide Planning Advisory Committee.

aquaculture project: A controlled discharge of pollutants to enhance growth or propagation of harvestable freshwater, estuarine, or marine life plant or animal species.

aquifer: A porous underground bed or stratum of earth, gravel or sand that contains fresh and potable water.

aquatic plants: Plants that grow in water either floating on the surface, growing up from the bottom of the body of water or growing under the surface of the water.

area source: Pollution from diffuse causes such as failing septic systems, leachate from landfills, stormwater runoff from streets.

bacteria: Single-celled microorganisms that lack chlorophyll. Some bacteria are capable of causing human, animal or plant diseases, others are essential in pollution control because they break down organic matter in the air and in the water.

Best Management Practice - (BMP): That combination of Technical measures and management arrangements that best meets a water quality goal, especially for non point sources of pollution.

benthic region: The bottom of a body of water. This region supports the benthos, a type of life that not only lives upon, but contributes to the character of the bottom.

benthos: The plant and animal life whose habitat is the bottom of a sea, lake or river.

bioassay: The employment of living organisms to determine the biological effect of some substance, factor or condition.

biochemical oxygen demand (BOD): A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. Large amounts of organic waste use up large amounts of dissolved oxygen, thus the greater the degree of pollution, the greater the BOD.

biodegradable: The process of decomposing quickly as a result of the action of microorganisms.

biological oxidation: The process by which bacterial and other microorganisms feed on complex organic materials and decompose them. Self-purification of waterways and activated sludge and trickling filter waste water treatment processes depend on this principle. The process is also called biochemical oxidation.

biomonitoring: The use of living organisms to test the suitability of effluent for discharge into receiving waters and to test the quality of such waters downstream from a discharge.

biota: All the species of plants and animals occurring within a certain area.

bloom: A proliferation of living algae and/or other aquatic plants on the surface of lakes or ponds. Blooms are frequently stimulated by phosphate enrichment.

BOD_5: The amount of dissolved oxygen consumed in five days by biological processes breaking down organic matter in an effluent. See biochemical oxygen demand.

bog: Wet, spongy land usually poorly drained, highly acid and rich in plant residue.

brackish water: A mixture of fresh and salt water.

cells: With respect to solid waste disposal, earthen compartments in which solid wastes are dumped, compacted and covered over daily with layers of earth.

channelization: The straightening and deepening of streams to permit water to move faster, to reduce flooding or to drain marshy acreage for farming. However, channelization reduces the organic waste assimilation capacity of the stream and may disturb fish breeding and destroy the stream's natural beauty.

chemical oxygen demand (COD): A measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water. The COD test, like the BOD test, is used to determine the degree of pollution in an effluent.

chlorination: The application of chlorine to drinking water, sewage or industrial waste for disinfection or oxidation of undesirable compounds.

chlorinator: A device for adding a chlorine-containing gas or liquid to drinking or waste water.

chlorine-contact chamber: In a waste treatment plant, a chamber in which effluent is disinfected by chlorine before it is discharged to the receiving waters.

CAC: Citizens Advisory Committee.

clarification: In waste water treatment, the removal of turbidity and suspended solids by settling, often aided by centrifugal action and chemically induced coagulation.

clarifier: In waste water treatment, a settling tank which mechanically removes setteable solids from wastes.

coastal zone: Coastal waters and adjacent lands that exert a measurable influence on the uses of the sea and its ecology.

coliform index: An index of the purity of water based on a count of its coliform bacteria.

coliform organism: Any of a number of organisms common to the intestinal tract of man and animals whose presence in waste water is an indicator of pollution and of potentially dangerous bacterial contamination.

collector sewers: Major public sewers that carry flows from laterals to interceptors.

combined sewers: A sewerage system that carries both sanitary sewage and storm water runoff. During dry weather, combined sewers carry all waste water to the treatment plant. During a storm, only part of the flow is intercepted because of plant overloading; the remainder goes untreated to the receiving stream.

comminution: Mechanical shredding or pulverizing of waste, a process that converts it into a homogeneous and more manageable material. Used in solid waste management and in the primary state of waste water treatment.

comminutor: A device that grinds solids to make them easier to treat.

compaction: Reducing the bulk of solid waste by rolling and tamping.

compost: Relatively stable decomposed organic material.

composting: A controlled process of degrading organic matter by microorganisms. (1) mechanical - a method in which the compost is continuously and mechanically mixed and aerated. (2) ventilated cell - compost is mixed and aerated by being dropped through a vertical series of ventilated cells. (3) windrow - an open-air method in which compostable material is placed in windrows, piles or ventilated bins or pits and occasionally turned or mixed. The process may be anaerobic or aerobic.

cover material: Soil that is used to cover compacted solid waste in a sanitary landfill.

cultural eutrophication: Acceleration by man of the natural aging process of bodies of water.

decomposition: Reduction of the net energy level and change in chemical composition of organic matter because of the actions of aerobic or anaerobic microorganisms.

digester: In a waste water treatment plant, a closed tank that decreases the volume of solids and stabilizes raw sludge by bacterial action.

digestion: The biochemical decomposition of organic matter. Digestion of sewage sludge takes place in tanks where the sludge decomposes, resulting in partial gasification, liquefaction and mineralization of pollutants.

dilution ratio: The ratio of the volume of water of a stream to the volume of incoming waste. The capacity of a stream to assimilate waste is partially dependent upon the dilution ratio.

disinfection: Effective killing by chemical or physical processes of all organisms capable of causing infectious disease. Chlorination is the disinfection method commonly employed in sewage treatment processes.

dissolved oxygen (DO): The oxygen dissolved in water or sewage. Adequately dissolved oxygen is necessary for the life of fish and other aquatic organisms and for the prevention of offensive odors. Low dissolved oxygen concentrations generally are due to discharge of excessive organic solids having high BOD, the result of inadequate waste treatment.

dissolved solids: The total amount of dissolved material, organic and inorganic, contained in water or wastes. Excessive dissolved solids make water unpalatable for drinking and unsuitable for industrial uses.

dredging: A method for deepening streams, swamps or coastal waters by scraping and removing solids from the bottom. The resulting mud is usually deposited in marshes in a process called filling. Dredging and filling can disturb natural ecological cycles. For example, dredging can destroy oyster beds and other aquatic life; filling can destroy the feeding and breeding grounds for many fish species.

dump: A land site where solid waste is disposed of in a manner that does not protect the environment.

dystrophic lakes: Lakes between eutrophic and swamp stages of aging. Such lakes are shallow and have high humus content, high organic matter content, low nutrient availability and high BOD.

effluent: A discharge of pollutants into the environment, partially or completely treated or in its natural state. Generally used in regard to discharges into waters.

enrichment: The addition of nitrogen, phosphorus and carbon compounds or other nutrients into a lake or other waterway that greatly increases the growth potential for algae and other aquatic plants. Most frequently, enrichment results from the inflow of sewage effluent or from agricultural runoff.

environment: The sum of all external conditions and influences affecting the life, development and, ultimately, the survival of an organism.

environmental impact statement: A document prepared by a Federal agency on the environmental impact of its proposals for legislation and other major actions significantly affecting the quality of the human environment. Environmental impact statements are used as tools for decision making and are required by the National Environmental Policy Act.

erosion: The wearing away of the land surface by wind or water. Erosion occurs naturally from weather or runoff but is often intensified by man's land-clearing practices.

estuaries: Areas where the fresh water meets salt water. For example, bays, mouths of rivers, salt marshes and lagoons. Estuaries are delicate ecosystems; they serve as nurseries, spawning and feeding grounds for a large group of marine life and provide shelter and food for birds and wildlife.

eutrophication: The normally slow aging process by which a lake evolves into a bog or marsh and ultimately assumes a completely terrestrial state and disappears. During eutrophication the lake becomes so rich in nutritive compounds, especially nitrogen and phosphorus, that algae and other microscopic plant life become super-abundant, thereby "choking" the lake, and causing it eventually to dry up. Eutrophication may be accelerated by many human activities.

eutrophic lakes: Shallow lakes, weed-choked at the edges and very rich in nutrients. The water is characterized by large amounts of algae, low water transparency, low dissolved oxygen and high BOD.

evaporation ponds: Shallow, artificial ponds where sewage sludge is pumped, permitted to dry and either removed or buried by more sludge.

facilities planning: Pertains to "provision for cost effective, environmentally sound and implementable treatment works which will meet applicable requirements of sections 201(g), 301, and 302 of the Act.

fecal coliform bacteria: A group of organisms common to the intestinal tracts of man and of animals. The presence of fecal coliform bacteria in water is an indicator of pollution and of potentially dangerous bacterial contamination.

fen: A low-lying land area partly covered by water.

filling: The process of depositing dirt and mud in marshy areas to create more land for real estate development. Filling can disturb natural ecological cycles. See dredging.

filtration: In waste water treatment, the mechanical process that removes particulate matter by separating water from solid material usually by passing it through sand.

floc: A clump of solids formed in sewage by biological or chemical action.

flocculation: In waste water treatment, the process of separating suspended solids by chemical creation of clumps or flocs.

flowmeter: In waste water treatment, a meter that indicates the rate at which waste water flows through the plant.

fungi: Small, often microscopic plants without chlorophyll. Some fungi infect and cause disease in plants or animals; other fungi are useful in stabilizing sewage or in breaking down wastes for compost.

game fish: Those species of fish sought by sports fishermen; for example, salmon, trout, black bass, striped bass, etc. Game fish are usually more sensitive to environmental changes and water quality degradation than "rough" fish.

ground cover: Grasses or other plants grown to keep soil from being blown or washed away.

groundwater: The supply of freshwater under the earth's surface in an aquifer or soil that forms the natural reservoir for man's use. (See surface water)

groundwater runoff: Groundwater that is discharged into a stream channel as spring or seepage water.

habitat: The sum total of environmental conditions of a specific place that is occupied by an organism, a population or a community.

heavy metals: Metallic elements with high molecular weights, generally toxic in low concentrations to plant and animal life. Such metals are often residual in the environment and exhibit biological accumulation. Examples include mercury, chromium, cadmium, arsenic and lead.

heterotrophic organism: Organisms dependent on organic matter for food.

humus: Decomposed organic material.

hydrogen sulfide (H_2S): A malodorous gas made up of hydrogen and sulfur with the characteristic odor of rotten eggs. It is emitted in the natural decomposition of organic matter and is also the natural accompaniment of advanced stages of eutrophication. H_2S is also a byproduct of refinery activity and the combustion of oil during power plant operations. In heavy concentrations, it can cause illness.

hydrology: The science dealing with the properties, distribution and circulation of water and snow.

hypolimnion: The cooler bottom waters of a lake. In lakes deeper than 40' these water don't mix with surface waters.

implementation plan: A document of the steps to be taken to ensure attainment of environmental quality standards within a specified time period. Implementation plans are required by various laws.

impoundment: A body of water, such as a pond, confined by a dam, dike, floodgate or other barrier.

infiltration: The flow of a fluid into a substance through pores or small openings. Commonly used in hydrology to denote the flow of water into soil material.

infiltration/inflow: Total quantity of water entering a sewer system. Infiltration means entry through such sources as defective pipes, pipe joints, connections, or manhole walls. Inflow signifies discharge into the sewer system through service connections from such sources as area or foundation drainage, springs and swamps, storm waters, street wash waters, or sewers.

inoculum: Material such as bacteria placed in compost or other medium to initiate biological action.

interceptor sewers: Sewers used to collect the flows from main and trunk sewers and carry them to a central point for treatment and discharge. In a combined sewer system, where street runoff from rains is allowed to enter the system along with sewage, interceptor sewers allow some of the sewage to flow untreated directly into the receiving stream, to prevent the plant form being overloaded.

interstate carrier water supply: A water supply whose water may be used for drinking or cooking purposes aboard common carriers (planes, trains, buses and ships) operating interstate. Interstate carrier water supplies are regulated by the Federal government.

interstate waters: According to law, waters defined as: (1) rivers, lakes and other waters that flow across or form a part of State or international boundaries; (2) waters of the Great Lakes; (3) coastal waters - whose scope has been defined to include ocean waters seaward to the territorial limits and waters along the coastline (including inland streams) influenced by the tide.

lagoon: In waste water treatment, a shallow pond usually man-made where sunlight, bacterial action and oxygen interact to restore waste water to a reasonable state of purity.

land use controls: Methods for regulating the uses to which a given land area may be put, including such things as zoning, subdivision, regulation, and flood plain regulation.

lateral sewers: Pipes running underneath city streets that collect sewage from homes or businesses.

leachate: Liquid that has percolated through solid waste or other mediums and has extracted dissolved or suspended materials from it.

leaching: The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

lift: In a sanitary landfill, a compacted layer of solid waste and the top layer of cover material.

limnology: The study of the physical, chemical, meteorological and biological aspects of fresh waters.

marsh: A low-lying tract of soft, wet land that provides an important ecosystem for a variety of plant and animal life but often is destroyed by dredging and filling.

mercury: A heavy metal, highly toxic if breathed or ingested. Mercury is residual in the environment, showing biological accumulation in all aquatic organisms, especially fish and shell fish. Chronic exposure to airborne mercury can have serious effects on the central nervous system.

methane: Colorless, nonpoisonous and flammable gaseous hydrocarbon. Methane, (CA_4), is emitted by marshes and by dumps undergoing anaerobic decomposition.

mgd: Millions of gallons per day. Mgd is commonly used to express rate of flow.

microbes: Minute plant or animal life. Some disease-causing microbes exist in sewage.

mixed liquor: A mixture of activated sludge and water containing organic matter undergoing activated sludge treatment in the aeration tank.

muck soils: Soils made from decaying plant materials.

mulch: A layer of wood chips, dry leaves, straw, hay, plastic strips or other material placed on the soil around plants to retain moisture, to prevent weeds from growing and to enrich soil.

1983 goals: Goals outlined in sec. 101(a) and elsewhere in the Act with emphasis on making waters swimmable and fishable wherever attainable.

nitrogenous wastes: Wastes of animal or plant origin that contain a significant concentration of nitrogen.

nutrients: Elements or compounds essential as raw materials for organism growth and development; for example, carbon, oxygen, nitrogen and phosphorus.

oil spill: The accidental discharge of oil into oceans, bays or inland waterways. Methods of oil spill control include chemical dispersion, combustion, mechanical containment and absorption.

oligotrophic lakes: Deep lakes that have a low supply of nutrients and thus contain little organic matter. Such lakes are characterized by high water transparency and high dissolved oxygen.

open burning: Uncontrolled burning of wastes in an open dump.

outfall: The mouth of a sewer, drain or conduit where an effluent is discharged into the receiving waters.

oxidation: A chemical reaction in which oxygen unites or combines with other elements. Organic matter is oxidized by the action of aerobic bacteria; thus oxidation is used in waste water treatment to break down organic wastes.

oxidation pond: A man-made lake or pond in which organic wastes are reduced by bacterial action. Often oxygen is bubbled through the pond to speed the process.

package plant: A prefabricated or prebuilt waste water treatment plant.

pathogenic: Causing or capable of causing disease.

peat: Partially decomposed organic material.

percolation: Downward flow or infiltration of water through the pores or spaces of a rock or soil.

point source: Pollution from concentrated sources such as a pipe or channel. A stationary wastewater discharge usually from an industrial or municipal facility.

pollutant: Any introduced gas, liquid or solid that makes a resource unfit for a specific purpose.

pollution: The presence of matter or energy whose nature, location or quantity produces undesired environmental effects.

potable water: Water suitable for drinking or cooking purposes from both health and aesthetic considerations.

ppm: Parts per million. The unit commonly used to represent the degree of pollutant concentration where the concentrations are small. Larger concentrations are given in percentages. Thus BOD is represented in ppm while suspended solids in water are expressed in percentages. In air, ppm is usually a volume/volume ratio; in water, a weight/volume ratio.

pretreatment: In waste water treatment, any process used to reduce pollution load before the waste water is introduced into a main sewer system or delivered to a treatment plant for substantial reduction of the pollution load.

primary treatment: The first stage in waste water treatment in which substantially all floating or settleable solids are mechanically removed by screening and sedimentation.

pulverization: The crushing or grinding of material into small pieces.

pumping station: A station to which sewage is pumped to a higher level. In most sewer systems pumping is unnecessary; waste water flows by gravity to the treatment plant.

putrescible: Capable of being decomposed by microorganisms with sufficient rapidity to cause nuisances from odors, gases, etc. For example, kitchen wastes or dead animals.

rasp: A device used to grate solid waste into a more manageable material, ridding it of much of its odor.

raw sewage: Untreated domestic or commercial waste water.

receiving waters: Rivers, lakes, oceans or other bodies that receive treated or untreated waste waters.

recycling: The process by which waste materials are transformed into new products in such a manner that the original products may lose their identity.

refuse reclamation: The process of converting solid waste to saleable products. For example, the composting of organic solid waste yields a saleable soil conditioner.

reservoir: A pond, lake, tank or basin, natural or man-made, used for the storage, regulation and control of water.

resource recovery: The process of obtaining materials or energy, particularly from solid waste.

riparian rights: Rights of a land owner to the water on or bordering his property, including the right to prevent diversion or misuse of upstream water.

river basin: The total area drained by a river and its tributaries.

rough fish: Those fish species considered to be of poor fighting quality when taken on tackle or of poor eating quality; for example, gar, suckers, etc. Most rough fish are more tolerant of widely changing environmental conditions than are game fish.

rubbish: A general term for solid waste-excluding food waste and ashes-taken from residences, commercial establishments and institutions.

runoff: The portion of rainfall, melted snow or irrigation water that flows across ground surface and eventually is returned to streams. Runoff can pick up pollutants from the air or the land and carry them to the receiving waters.

salt water intrusion: The invasion of salt water into a body of fresh water, occurring in either surface or groundwater bodies. When this invasion is caused by oceanic waters, it is called sea water intrusion.

salvage: The utilization of waste materials.

sanitation: The control of all the factors in man's physical environment that exercise or can exercise a deleterious effect on his physical development, health and survival.

sanitary landfill: A site for solid waste disposal using sanitary landfilling techniques.

sanitary landfilling: An engineered method of solid waste disposal on land in a manner that protects the environment; waste is spread in thin layers, compacted to the smallest practical volume and covered with soil at the end of each working day.

sanitary sewers: Sewers that carry only domestic or commercial sewage. Storm water runoff is carried in a separate system. See sewer.

screening: The removal of relatively coarse floating and suspended solids by straining through racks or screens.

secondary treatment: Waste water treatment, beyond the primary stage, in which bacteria consume the organic parts of the wastes. This biochemical action is accomplished by use of trickling filters or the activated sludge process. Effective secondary treatment removes virtually all floating and settleable solids and approximately 90 percent of both BOD_5 and suspended solids. Customarily, disinfecion by chlorination is the final stage of the secondary treatment process.

sedimentation: In waste water treatment, the settling out of solids by gravity.

sedimentation tanks: In waste water treatment, tanks where the solids are allowed to settle or to float as scum. Scum is skimmed off; settled solids are pumped to incinerators, digesters, filters or other means of disposal.

seepage: Water that flows through the soil.

segment: A portion of a river basin, the surface waters of which have common hydrologic characteristic (or flow regulation patterns); common natural, physical, chemical, and biological processes and common reactions to external stresses such as discharging of pollutants.

septage: Liquid and solid material pumped from a septic tank during cleaning.

septic tank: An underground tank used for the deposition of domestic wastes. Bacteria in the wastes decompose the organic matter, and the sludge settles to the bottom. The effluent flows through drains into the ground. Sludge is pumped out at regular intervals.

settleable solids: Bits of debris and fine matter heavy enough to settle out of waste water.

settling tank: In waste water treatment, a tank or basin in which settleable solids are removed by gravity.

sewage: The total of organic waste and waste water generated by residential and commercial establishments.

sewer: Any pipe or conduit used to collect and carry away sewage or stormwater runoff from the generating source to treatment plants or receiving streams. A sewer that conveys household and commercial sewage is called a sanitary sewer. If it transports runoff from rain or snow, it is called a storm sewer. Often storm water runoff and sewage are transported in the same system or combined sewers.

sewerage: The entire system of sewage collection, treatment and disposal. Also applies to all effluent carried by sewers whether it is sanitary sewage, industrial wastes or storm water runoff.

silt: Finely divided particles of soil or rock. Often carried in cloudy suspension in water and eventually deposited as sediment.

sludge: The construction of solids removed from sewage during waste water treatment. Sludge disposal is then handled by incineration, dumping or burial.

soil conditioner: A biologically stable organic material such as humus or compost that makes soil more amenable to the passage of water and to the distribution of fertilizing material, providing a better medium for necessary soil bacteria growth.

solid waste: Useless, unwanted or discarded material with insufficient liquid content to be free flowing. Also see waste. (1) agricultural-solid waste that results from the raising and slaughtering of animals, and the processing of animal products and orchard and field crops. (2) commercial waste generated by stores, offices and other activities that do not actually turn out a product. (3) industrial-waste that results from industrial processes and manufacturing. (4) institutional-waste originating from educational, health care and research facilities. (5) municipal-residential and commercial solid waste generated within a community. (6) pesticide-the residue from the manufacturing, handling or use of chemicals intended for killing plant and animal pests. (7) residential-waste that normally originates in a residential environment. Sometimes called domestic solid waste.

solid waste disposal: The ultimate disposition of refuse that cannot be salvaged or recycled.

solid waste management: The purposeful, systematic control of the generation, storage, collection, transport, separation, processing, recycling, recovery and disposal of solid wastes.

spoil: Dirt or rock that has been removed from its original location, specifically materials that have been dredged from the bottoms of waterways.

stabilization: The process of converting active organic matter in sewage sludge or solid wastes into inert, harmless material.

storm sewer: A conduit that collects and transports rain and snow runoff back to the ground water. In a separate sewerage system, storm sewers are entirely separate from those carrying domestic and commerical waste water.

strip mining: A process in which rock and top soil strata overlying ore or fuel deposits are scraped away by mechanical shovels. Also known as surface mining.

sump: A depression or tank that serves as a drain or receptacle for liquids for salvage or disposal.

surface water: Water on the earth's surface exposed to the atmosphere as rivers, lakes, streams, the oceans. (See groundwater.)

suspended solids (SS): Small particles of solid pollutants in sewage that contribute to turbidity and that resist separation by conventional means. The examination of suspended solids and the BOD test constitute the two main determinations for water quality performed at waste water treatment facilities.

tertiary treatment: Waste water treatment beyond the secondary, or biological stage that includes removal of nutrients such as phosphorus and nitrogen, and a high percentage of suspended solids. Tertiary treatment, also known as advanced waste treatment, produces a high quality effluent.

thermal pollution: Degradation of water quality by the introduction of a heated effluent. Primarily a result of the discharge of cooling waters from industrial processes, particularly from electrical power generation. Even small deviations from normal water temperatures can affect aquatic life. Thermal pollution usually can be controlled by cooling towers.

topography: The configuration of a surface area including its relief, or relative elevations, and the position of its natural and man-made features.

toxic pollutants: A combination of pollutants including disease-carrying agents which, after discharge and upon exposure, ingestion, inhalation, or assimilation into any organism can cause death or disease, mutations, deformities, or malfunctions in such organisms or their offspring.

trickling filter: A device for the biological or secondary treatment of waste water consisting of a bed of rocks or stones that support bacterial growth.

turbidimeter: A device used to measure the amount of suspended solids in a liquid.

turbidity: A thick, hazy condition of air due to the presence of particulates or other pollutants, or the similar cloudy condition in water due to the suspension of silt or finely divided organic matter.

urban runoff: Storm water from city streets and gutters that usually contains a great deal of litter and organic and bacterial wastes.

variance: Sanction granted by a governing body for delay or exception in the application of a given law, ordinance or regulation.

waste: Also see solid waste. (1) bulky waste - items whose large size precludes or complicates their handling by normal collection, processing or disposal methods. (2) construction and demolition waste - building materials and rubble resulting from construction, remodeling, repair and demolition operations. (3) hazardous waste - wastes that require special handling to avoid illness or injury to persons or damage to property. (4) special waste - those wastes that require extraordinary management. (5) wood pulp waste - wood or paper fiber residue resulting from a manufacturing process. (6) yard waste - plant clippings, prunings and other discarded material from yards and gardens. Also known as yard rubbish.

waste water: Water carrying wastes from homes, businesses and industries that is a mixture of water and dissolved or suspended solids.

water pollution: The addition of sewage, industrial wastes or other harmful or objectional material to water in concentrations or in sufficient quantities to result in measurable degradation of water quality.

water quality criteria: The levels of pollutants that affect the suitability of water for a given use. Generally, water use classification includes: public water supply; recreation; propagation of fish and other aquatic life; agricultural use and industrial use.

water quality standard: A plan for water quality management containing four major elements: the use (recreation, drinking water, fish and wildlife propagation, industrial or agricultural) to be made of the water; criteria to protect those uses; implementation plans (for needed industrial-municipal waste treatment improvements) and enforcement plans, and an anti-degradation statement to protect existing high quality waters.

watershed: The area drained by a given stream.

water supply system: The system for the collection, treatment, storage and distribution of potable water from the sources of supply to the consumer.

water table: The upper level of ground water. Level below which all of the pore spaces are filled with water.

wetlands: Swamps or marshes, especially as areas preserved for wildlife.

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LEGEND
CHANGE IN PERMITTED LAND USE
CHANGE IN LAND USE DENSITY
CHANGES IN PERMITTED LAND USE AND DENSITY
AREAS TO BE CONSIDERED FOR SEWER SERVICE IN 201 STUDY
RECOMMENDED ADOPTION OF OR ADDITIONS TO WETLANDS/FLOOD PLAIN DISTRICTS
RECOMMENDED STREAM/POND BUFFER DISTRICT
RECOMMENDED WATERSHED PROTECTION DISTRICT
Atlantic Ocean
TOPSFIELD
HAMILTON
WENHAM
MIDDLETON
MANCHESTER
DANVERS
BEVERLY
NORTH READING
WILMINGTON
READING
LYNNFIELD
PEABODY
LITTLETON
BURLINGTON
BEDFORD
WAKEFIELD
SALEM
MARBLEHEAD
ACTON
WOBURN
LYNN
SWAMPSCOTT
STONEHAM
SAUGUS
CONCORD
WINCHESTER
MELROSE
STOW
LEXINGTON
MAYNARD
LINCOLN
ARLINGTON
MEDFORD
MALDEN
NAHANT
REVERE
EVERETT
HUDSON
SUDBURY
WALTHAM
BELMONT
SOMERVILLE
CHELSEA
WATERTOWN
CAMBRIDGE
EAST BOSTON
WINTHROP
WESTON
BOSTON
MARLBOROUGH
WAYLAND
NEWTON
BROOKLINE
FRAMINGHAM
WELLESLEY
SOUTHBOROUGH
NATICK
NEEDHAM
HULL
Hull Bay
Quincy Bay
Dorchester Bay
Boston Harbor
Ipswich River
Concord River
Sudbury River
Charles River
Mystic River
Saugus River
Malden River
Mill Creek
Chelsea River
Sandy Pond
Cambridge Reservoir
Horn Pond
Spot Pond
Fells Reservoir
Fellsmere Pond
Winchester Reservoirs
Wedge Pond
Upper Mystic Lake
Lower Mystic Lake
Arlington Reservoir
Spy Pond
Fresh Pond
Morses Pond
Seaverns Bk
Holts Bk
Aberjona River
Stony Bk
Hobbs Bk
Crystal Cove
Deer Island
Airport
495
2
62
128
93
95
225
1
117
126
27
60
16
20
30
90
9
3
3A
28
203
135
6

0 4000 8000 16000

SCALE IN FEET

NORTH

SOURCE: BASE MAP, U.S. GEOLOGICAL SURVEY
DATA: 208 WATER QUALITY PROJECT, 1977.

Recommended 208 Areawide Plan

Mass.MP1.2:D78/pt.1, vol. 1 map insert

Draft areawide waste treatment management plan
for the Metropolitan Boston Area.